1859 FIFTY-NINTH YEAR 1917

AMERICAN GAS ENGINEERING JOURNAL

FORMERLY

AMERICAN GAS LIGHT JOURNAL

VOL. CVII., NO. 7
WHOLE No. 3102

NEW YORK, SATURDAY, AUGUST 18, 1917

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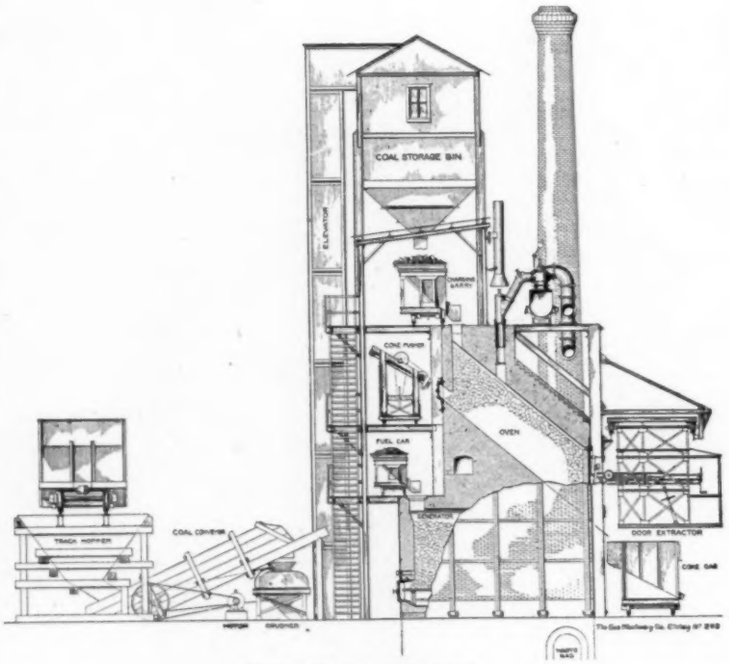

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Vol. CVII, No. 7 NEW YORK, AUGUST 18, 1917 Whole No. 3102

Installation Made for Welding Tool-Steel Face on to Soft-Steel Slab for Rotary Cutter Knives Demonstrates Availability of Gas for Such Work

AUG 20 1917
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Groundless Theories in Regard to Such Work Conclusively Disproved—Necessity of Homogeneously Premixed and Perfectly Proportioned Mixture of Gas and Air—Means to Secure Such Conditions Must Be Automatic

By CHARLES E. RICHARDSON
Surface Combustion Company, Long Island City, N. Y.

Until recently, welding has been considered impossible in furnaces with city gas. Without doubt, many actual difficulties have stood in the way, but not of an insurmountable character. The chief deterrents to successful welding in gas-fired furnaces have been a number of rather vague theories and a large number of unsuccessful trials. When these failures were properly analyzed, the causes of failure could be readily seen and avoided as will be explained in detail. The theories, when analyzed, disappeared, having no foundation.

Probably the most common of the vague theories was the belief that the chemical composition of the gas itself in some way rendered it unfit for use as a fuel for welding. The following may be cited as an example of the manner in which this particular theory tended to block the extension of gas in this fertile field. When the installation about to be described was first considered, a gas engineer connected with the job was very much opposed to any attempt to do the work, saying that the gas to be used did not have enough CO in it. Just what effect the CO was supposed to have could not be explained.

Underlying Belief in Designing Installation

The belief of those designing the installation was that welding came about solely as a result of temperature plus a furnace atmosphere slightly reducing at all points. It was felt that the only relation the chemical composition of the fuel bore to the result was that it must be of such a composition as to yield a gas strong enough to give a flame temperature sufficient to make possible the securing economically of the temperatures required by the operation.

In analyzing the failures, it was found that, after excluding a few which were due to failure to obtain the necessary temperatures, the trouble lay almost without exception in the matter of furnace atmosphere. While the products of combustion issuing from the flues analyzed perfectly for the work, it was found that inside, at various points, anything but perfect conditions existed. This variation was caused by lack of suitable means for automatically proportioning and mixing.

Details of Design

To explain specifically, the air and the gas, not having been homogeneously premixed in the correct proportions, entered the furnace through the several burners in a stratified condition. Molecules of oxygen and combustible had therefore to wander around in the furnace to find one another before reacting. This meant that the steel was exposed at very high temperature to free oxygen in spots and oxidization became active enough to make the operation impossible. Of course, the molecules of oxygen and combustible did finally meet and react and the flue gases therefore looked to be satisfactory, but they merely represented the sum total of the reactions. This condition of affairs showed conclusively that if satisfactory welding was to be accomplished, means must be secured to deliver to the furnace a homogeneously premixed and perfectly proportioned mixture of gas and air and further that said means must be automatic, so that when the proportions were once set, they would hold irrespective of the quantity of mixture supplied.

The designers therefore, knowing that it was readily possible to secure the necessary temperatures and that

FIG. 4. FURNACE IN OPERATION

suitable proportioning and mixing devices could be obtained, and feeling that the theories regarding the chemical composition of the fuel were groundless, undertook the installation described below.

The design of the furnace is shown in Figs. 1, 2 and 3.

It is made up of two working chambers, one 32 in. deep x 14 in. wide x 10 in. high, and the other 48 in. deep x 20 in. wide x 10 in. high, with a preheating chamber 48 in. deep x 12 in. wide x 15 in. high between. The working chambers can be used separately or both together according to the size and amount of work to be handled. So far one chamber has been found sufficient to handle the tonnage required. The flue gases from the working chambers pass into the preheating chamber and out the rear of same. The working chambers are held at a temperature of between 2,700 and 2,800 deg. Fahr. This yields a temperature of approximately 1,800 deg. Fahr. in the preheating chamber.

The furnace is fired with Surface Combustion High Pressure burners and both quantity and quality of mixture is controlled by Surface Combustion High Pressure control devices.

The furnace is used in the production of machine knives for rotary cutters of wood working and other similar machines. The finished knives consist of a slab of soft steel with a thin layer of tool steel welded on one face. The dimensions of the stock used vary greatly; an average for the soft steel slabs would be 34 in. x 8 in. x 1½ in.

The welding operation is as follows: A pile of eight or ten soft steel slabs is placed in the preheating chamber at the beginning of the day's run. When the desired

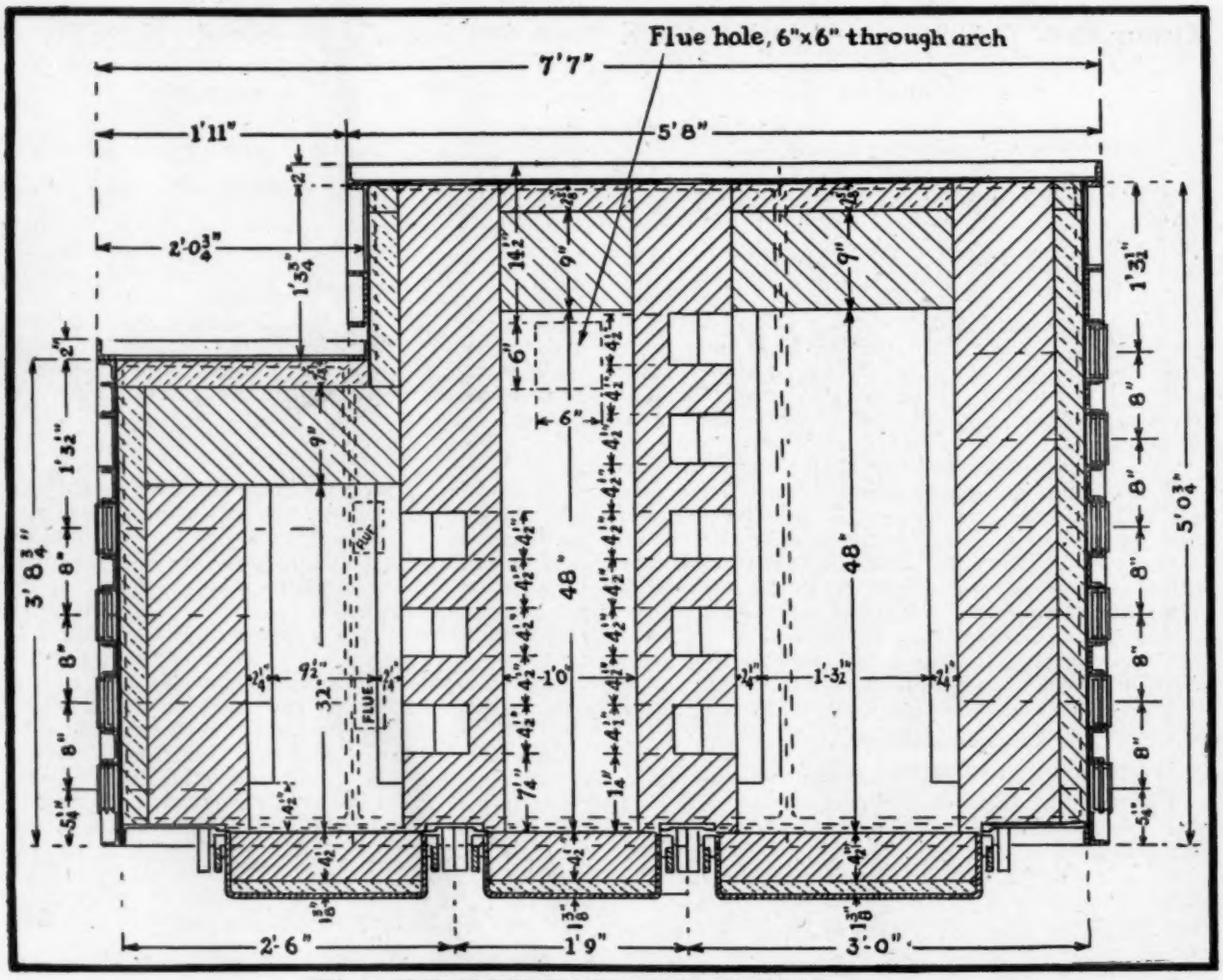

FIG. 1. PLAN OF INSTALLATION GIVING DIMENSIONS, ETC.

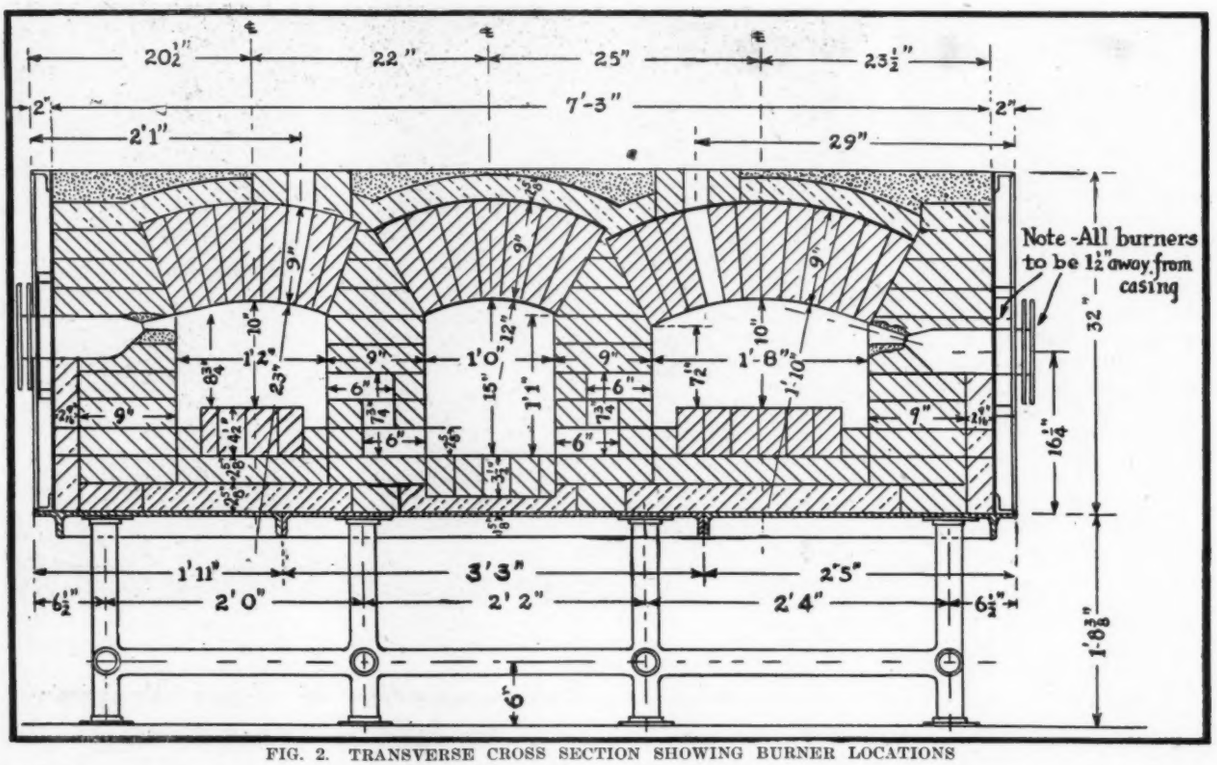

FIG. 2. TRANSVERSE CROSS SECTION SHOWING BURNER LOCATIONS

temperatures have been obtained, one of these is placed in the work chamber after sprinkling the surface with borax. When heated to between 1,900 and 2,000 deg. Fahr., it is removed, the scale scraped from the surface and the tool steel strips placed in position flush with one edge and well sprinkled with borax. The piece is then replaced and brought to welding temperature. It is then again removed, welded under a power hammer and rolled to size. Often several reheats are necessary to finish the welding and rolling. The piece is allowed to cool after rolling, cut to size, hardened, tempered and ground to finished dimensions.

An illustration of the furnace in operation is shown in Fig. 4. Figs. 5 and 6 illustrate the above-described method of welding and rolling.

Gas Consumption

Because of the preheating and the reheats which vary greatly, it is impossible to state the efficiency of this furnace; suffice it to say on this point that the furnace handles 1,700 lb. of work in nine hours on a consumption of 12,700 cu. ft. of 580 B.t.u. gas. These figures by no means represent the capacity of the furnace but give an indication of the consumption of gas per ton of welded stock. The above figures are taken from a test made on the large working chamber. It is entirely possible to at least treble the tonnage indicated in the above figures.

It was found that the mixture of gas and air, which gave the most satisfactory welds, resulted in a flue gas analysis as follows:

FIG. 5. WELDING HAMMER AT WORK

CO_2 = 11.8 per cent
O_2 = 0.0 per cent
CO = 0.4 per cent

The theoretical CO_2 figured from an analysis of the gas used is 12.5 per cent, which checks closely with the above figures.

The installation has been in operation for several months and the following advantages over handling the same work by oil-firing have been found:

1. Quicker heating up, both of furnace and work.
2. Cooler and cleaner shop.
3. Increased capacity.
4. Far greater control of temperature and furnace atmosphere.
5. Greater availability of fuel supply.
6. Greater reliability and continuity of operation.
7. Less scale.
8. No fuel storage.
9. Price of fuel not subject to fluctuation.
10. Less repair expenses—longer life to parts and greater ease of making repairs.
11. Easier to light up and operate—single valve control.
12. More constant composition and heating value of fuel.
13. No capital invested in stored fuel.

It is felt that this installation thoroughly demonstrates the availability of gas for welding work and that a heretofore untouched field is now open to the gas industry. Doubtless many more installations of this character will be made, but care must be taken as regards the points herein emphasized to insure success.

The above-described furnace was designed and installed by The Surface Combustion Company, of Long Island City, N. Y., at the plant of D. Lovejoy & Sons, Lowell, Mass. Gas is supplied by the Lowell Gas Light Company, on a sliding scale basis, which makes gas available at a rate of approximately 70 cents per thousand.

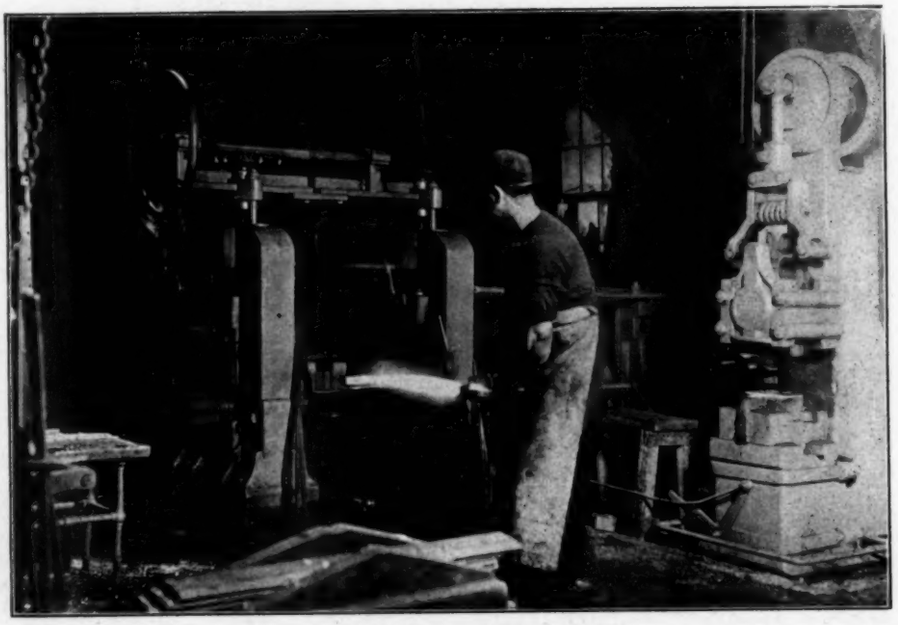

FIG. 6. ROLLING THE STOCK TO SIZE

Confidence in Gas Meters

"Until we have a gas meter that will show when and for what purpose the gas is consumed, and customers who remember having used the gas (and these conditions will never be fulfilled) we cannot expect to satisfy otherwise than through their confidence. I believe the way of gaining this confidence is in hammering into the public mind the questions: Is your meter accurate? Is it read accurately? Will you see it tested at our shop, or at the office of the public meter inspector? Will you learn to read your meter and check our men?"—*R. C. Congdon.*

Middletown Gas Light Company to Raise Rates

The Middletown (Conn.) Gas Light Company has announced that beginning with the September bills, the rate for gas would be increased 20 cents a thousand feet. The company states in the announcement that this increase only partially takes care of the increase they have had to meet in the price of coal and gas oil.

Reorganization of Coal Transport by Rail in Great Britain

Intended to Relieve Rail Traffic By Reduction in Average Mileage—Defects in Bill—Saving in Mileage May Be Largely Discounted by Greater Tonnage to be Conveyed

By NORTON H. HUMPHRYS

The gas industry in Great Britain has had to submit to many embarrassing restrictions since the outbreak of war, and a new scheme for the control of railway coal traffic, issued by the controller of coal mines under the authority of the Board of Trade, while leaving many unscathed, will press more hardly on other gas undertakings than any regulation previously introduced.

It refers to railborne bituminous or cannel, but not to

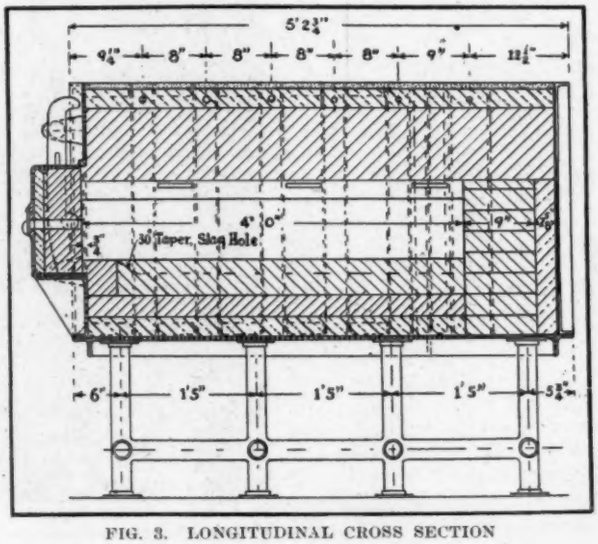

FIG. 3. LONGITUDINAL CROSS SECTION

water-carried coal, or to anthracite and coke. But as sea borne coal is practically stopped by exorbitant shipping charges, it covers practically the entire consumption for gas making; and comes at a time when petroleum and other suitable liquids are unobtainable, and we are left without a second string to the bow. The scheme takes effect on and after the tenth of September, and on that date all contracts that do not conform to it will become illegal and practically void.

Country Laid Out in Districts

The country has been laid out in districts on the basis of coal producing or consuming capacity; and a glance at the map shows that while large manufacturing users gravitate towards the area of supply, the bulk of the consumers are not in a position to do so. Coal is found in all the divisions except two, but in some the quantity is inconsiderable or the quality throws it out of court. England comprises sixteen divisions, and Scotland four, and gas undertakings hitherto enjoying unrestricted rights of purchase, will now be limited to their own pitch, or if that is unproductive, to one or two adjacent areas. The whole of the Scottish, and half of the English districts, are not to buy from outside; and abrogated contracts are to be replaced by others arranged by district committees, composed of colliery and railway representatives, with the addition of one independent member on each.

Relief of Rail Traffic

The principal objects are the relief of rail traffic by a reduction in average mileage; the confining of coal consumption, as far as practicable, to the division in which it is raised; conveyance preferably by main trunk railways in well defined direct lines from pit to store; that an area unable to cover its own requirements shall not send any portion outside; and that a more than self-supporting area, shall not deliver the excess beyond the nearest consuming divisions. The only exceptions named are the need for providing fuel of a special type for certain purposes, which have been determined by direct communication with the consumers, and arrangements are being made for supply of steam raiser's requirements in this respect. This clause may bear upon the use of coal for locomotives. If special inquiries had also been addressed to the gas undertakings most hardly hit by the new restrictions, these exceptions would probably have been extended.

Consideration of Complaints

A National scheme of such magnitude must in the order of things be attended with defects, and these can be mentioned without reflection on the ability of those who have applied an enormous amount of skill and labor to the object of assisting National affairs at a time of need. The controller of coal mines is assisted by a prominent gas engineer as technical adviser, who presumably watches, not exactly the interests, but the avoidance of unnecessarily severe or unfair strain on the gas industry. Yet an important oversight in the scheme is the effect of varying quality. Some of the divisions do not produce any material that is worthy the title of gas coal. Substitution will in many cases mean a serious influence on the yield of products, and facilities of working. One is reminded of the coal dealer who replied to a complaint of excessive price by remarking, "coal is coal, nowadays," to which the customer replied, "I am glad to hear that, because the last lot you sent me was nearly all slate."

The coal controller practically tells us that one brand of coal is as good as another. Already complaint comes from Scotland, that one important district does not raise a ton of workable gas coal, and that the gas industry cannot carry on in the absence of outside supplies. Prompt attention on the part of the controller augurs well for fair consideration of any substantial grievance elsewhere. England will furnish several similar examples, where it has been preferable to use coal from a distance, because the local fuel is slow burning in the retort, gives a low yield of poor or impure gas, pitches up the ascensions and hydraulics, and yields a coke that is too soft for the cupola or unsuited to the regenerator furnace.

The people who are responsible for meeting the obligations of the gas works must be credited with a knowledge of their requirements, and the most economical methods of meeting them. Railway transport rates are not a small matter.

Before the war, the fact that they were much higher than in any other country was a matter of frequent comment, and a run of 200 miles or so means doubling the cost in the store.

In regard to some of the southern districts, it is safe to say that out of the total cost of the coal as delivered on the retort house floor, the railways pocket the larger share. Such heavy charges are not incurred without good reasons, and a cast iron restriction would not only add substantially to the financial losses already endured, but upset labor and other working conditions at the gas works.

The labor party as a whole, are more inclined to exploit the position in their own favor, than to accept increased exertion for the good of the Nation, and the times are not congenial to an addition to the most arduous branches of the labor on a gas works. It should rather be reduced in sympathy with the capabilities of the weak and inexperienced staff.

From the coal controller's point of view, the fact that inferior coal means increased tonnage should not be overlooked, A work accustomed to make 12,000 cu. ft. per ton, and 8,000 per mouthpiece, may be compelled to use a coal that will not yield more than 9,000 and 5,000 respectively. This not only means a more than proportionate increase in the number of retorts under fire, and the retort house staff, but an increased consumption of coal to the extent of one-third. Saving in milage may be largely discounted by greater tonnage to be conveyed.

Utilizes Gas Works Dust and Soot to Produce Coke

In a recent issue of *Het Gas*, an account was given of some experiments made by Herr Alting, of the Amsterdam Eastern Gas-Works, with dust and soot as gas-producing materials. As in these critical times grain of fuel has its value for gas-making purposes, the author had the idea of using refuse which might in ordinary times be regarded as valueless for the production of gas.

The aim was to mix the material with a sufficient quantity of coal tar, and to carbonize the resultant product in retorts temporarily out of action. The first trial was made with 50 kg. of water-gas dust, mixed with 15 kg. of raw tar. The mixture was carbonized for three hours at 1,000 deg. Celsius.

The coke was valueless, being very soft, and easily reduced to powder. When the amount of tar was increased to 20 kg., there was obtained a coke of better

quality, though still lacking in hardness. This was usable under steam-boilers.

With 30 kg. of tar, the coke was hard and light gray in color, being quite suitable for use as an ordinary fuel. When consumed in an open fire, it was found to last longer than ordinary gas coke and to give more heat, nothing but ashes being left in the grate.

Further experiments with dust from other sources clearly showed that the amount of tar necessary to afford adequate binding, and resistance in the resultant coke, was at least 60 per cent of the weight of the dust.

As the intention was to remove as much valueless material as possible, the following experiments were made with the pitchy material from the hydraulic mains and the tar-separators:

A mixture of 50 parts of water-gas dust and 30 parts of pitchy tar, carbonized for three and one-half hours, produced 50 parts of small coke and 12½ parts of breeze. The coke was hard, light gray in color, and was found to burn well. Not so hard, but otherwise of good quality, was the coke produced from a mixture of 25 parts of water-gas dust and the same amount of dust from the coal-gas plant.

In this case, there were produced 47 parts of small coke and 18½ parts of breeze. In the same manner, there were treated dust from the roof of the water-gas plant, from the roof of the workshop, and from the flues of the boiler-house. This produced a coke which was very hard and dark gray in color.

The result, therefore, is to show that mixtures of dust from various parts of a gas-works with 60 per cent of their weight of thick tar carbonized for three to three and one-half hours at about 1,000 deg. Celsius gives coke that is usable as household fuel, and has the advantage of leaving only ash in the grate. The amount of ash, calculated as dry matter, of the different types of coke, varied between 13 and 23 per cent, the average being 15 per cent.

A trial with about 10 metric tons of the mixture demonstrated that, when all charges had been taken into account, the cost price of the coke per ton was somewhat more than $2, the breeze being regarded as of no value.

Sceptical as to Advantages of Low Temperature Carbonization

As regards low-temperature carbonization, I have an entirely open mind, declares E. W. Smith, chief chemist of the Birmingham Corporation Gas Department, in an article in a recent issue of the *Gas Journal* (British). I can see many objections to it as compared with present methods, and so far few advantages if it is proposed to displace the present methods of carbonization by the new ones. The wish to centralize power stations near the pits, and so reduce freight, appears to be largely a delusion—a snare. When applied in conjunction with the process of low-temperature carbonization, the solid fuel produced will amount to over 75 per cent of the original coal. It will occupy a space more than that of the original coal; and wagon hire will be increased correspondingly. It is surely wasteful to leave in the solid residue at least 10 per cent of volatile matter, or between 30 and 40 per cent of what was originally available in the coal.

Great claims are made for the yields of tar, but while the speculator may be satisfied with the increased yields shown, the technologist and engineer require figures indicating the constitution of these tars, as compared with coal tar, and their commercial value after full trials. The process of low temperature is, however, wasteful in gaseous fuel and ammonia. About 5,500 cu. ft. of gas is obtained, of a total heating value of 750 B.t.u. per cubic foot, or an available quantity of heat in the form of gaseous fuel of 4,125,000 B.t.u. per ton of coal. Gas-works practice (high-temperature carbonization) would give 12,000 cu. ft. of gas of 550 B.t.u. gross, or an available quantity of heat in the form of gaseous fuel of 6,600,000 B.t.u.—an increase of 60 per cent. The suggestion that the rich gas might be diluted with (say) blue water gas is not a very practicable one, and would certainly not cost any less, unless the gas were evaluated according to coke-oven methods. From low-temperature carbonization the yield of ammonia per ton of coal corresponds to 20 lb. of sulphate, as compared with 28 lb. from gas-works practice; and if the coke be gasified in Mond producers, a further yield of 33 lb. may easily be obtained, or a total of 61 lb. from the original coal, as compared with 20 lb.

The volume of town gas sold in Birmingham for the year ended December 31, 1916, amounted to 10,733,000,000 cu. ft., of which 14 per cent was used in gas-engines, 19 per cent for industrial heating, and about 27 per cent for gas fires and cookers; giving a total of over 60 per cent for heating and power purposes. This total gas corresponds to about 720,000 tons of coal, from which, besides the gas, there has been obtained about 9,000,000 gallons of tar, 475,000 tons of coke, which is used for boilers, furnaces and metallurgical purposes, besides the large quantities employed in the production of water gas and producer gas from which by-products are obtained.

Enricher Gas from Synthetic Production of Gasoline

Eugene H. Leslie Points Out Advantages of Gas Manufacturer and Gasoline Producer Getting Closer Together

The great demand for gasoline in recent years due to the rapid increase in the use of explosion motors in pleasure and industrial cars has placed a premium on this product, declares Eugene H. Leslie in a paper prepared for the postponed convention of the American Gas Institute and published in *Gas Institute News*. The fact, too, that the great petroleum fields developed in late years with the exclusion of certain Oklahoma and Wyoming districts have been small producers of gasolines has also made the motor fuel situation more critical. The result has been the development of two types of processes for the synthetic production of gasolines.

Best Known Processes

The first of these is the liquid phase cracking process for heavy oils. The Burton process of the Standard Oil Company is the most notable example of a commercial development in this direction. The oil is introduced into a pressure still and distilled slowly under 75 to 100 lb. pressure.

The lighter distillates are not amenable to such treatment on account of their exceedingly high vapor pressures. If the temperature of an oil of kerosene grade or even gas oil grade is raised to the initial cracking temperature in the neighborhood of 360 deg. C. the pressure for its confinement in a still is several hundreds of pounds, in fact entirely incompatible with

safety when it is considered that a large still full of liquid is under treatment.

This state of affairs has led to the development of another type of process, the so-called vapor phase processes in which an oil is first vaporized and then passed through a zone heated to a temperature of 500 to 600 deg. C. The methods of Rittman, Hall and Greenstreet are the best known examples of the vapor phase processes.

Gas Production

Incidental to the formation of gasoline by these vapor phase processes a considerable quantity of a very rich gas is produced. With certain oils a furnace processing 500 barrels of oil per day will produce 100,000 to 200,000 cu. ft. of a very rich gas per 24 hours. The composition of the gas depends on the nature of the oil, but contains 65-45 per cent methane and ethane, 30-40 per cent ethylene and propylene and 10-15 per cent hydrogen. Its calorific value and candlepower are both high, and it would be a very suitable gas for the enrichment of blue gas or other poorer gases such as high temperature coke oven gases.

It has often occurred to me that the synthetic gasoline interests and the gas interests ought to "get together," since the one provides what the other so much needs. This is particularly true from another viewpoint. The oil which is now sold for the carbureting of water gas is an intermediate cut between the burning oils and the spindle oils. It is eminently suited for cracking purposes and synthetic gasoline production. The vapor phase cracking methods are as yet too little developed to exert a great influence, but their development is coming rapidly, and with it will come an increase in the value of so-called "gasoil."

From the standpoint of the petroleum refiner it is uneconomical to burn such a rich gas as the synthetic gas from his cracking processes. This is especially true in the natural gas fields where a good gas is obtainable at 15 cents per 1,000 cubic feet, or in the coal fields where good soft coals are available in quantity.

It seems, therefore, that it is logical both from an economical and practical standpoint for those of us who are interested in gas and those of us who are interested in gasoline to work together.

Large Increase in 1916 Coke Output

The production of coke in 1916 was 54,533,585 net tons, valued at $170,841,197, an increase compared with 1915 of 12,952,435 tons, or 31 per cent, in quantity, and $65,337,329, or 62 per cent, in value. These figures, compiled by C. E. Lesher, of the U. S. Geological Survey, from reports furnished by the operators, differ from his estimate of the production of coke in 1916 made on January 1 of this year by only 0.4 per cent.

The output of beehive coke was 35,464,224 tons, having a reported value of $95,468,127, an increase of nearly 29 per cent in quantity and 67 per cent in value compared with 1915. The production of by-product coke was 19,069,361 tons, valued at $75,373,070, an increase of 35.5 per cent in quantity and 55.2 per cent in value compared with the previous year. By-product coke represented nearly 35 per cent of the total in 1916 compared with 34 per cent in 1915.

The average number of beehive ovens in operation in 1916 was 65,605, compared with 48,985 in 1915, an increase of 16,620 ovens. The number of active by-product ovens increased from 6,036 in 1915 to 6,607 in 1916. Six new by-product coke plants, with an aggregate of 603 ovens, began operations in 1916 and had an aggregate output of 708,485 tons of coke. Every important producing state shared in the increase.

Little Gained in Installing Perfected Machinery if Competent Operators are Lacking

F. N. Newell Asserts it is Duty of Engineer to Repair the Depreciation in Quality of Labor His Inventions Have Brought About

The engineer, if true to his name, is the man of ingenuity. He has had the vision; he has dreamed of improved methods and machines; his dreams have come true. They have taken form and substance in engines of peace, as well as of war. He has made the strength of one man equal to that of a hundred of his forefathers. His machines—the product of his vision—perform the intricate tasks which a generation ago required the skill of a score of workers. He has created new necessities before unknown—in the railroad—the automobile—the telephone and in innumerable other devices. He has revised farming methods, one machine or tractor on a farm doing the work of many men and horses—releasing the farm laborer while making a demand for his services in the congested factory districts. He has rendered it possible for millions to live and to find work in the narrow confines of a city, and to bring them food and other necessities of daily life. In short he has raised the machines of wood and of metal to the height almost of human intellect. At the same time he has made conditions such as to permit the mental activity of large numbers of human beings to fall nearly to the level of the machine. These assertions were made by F. N. Newell, Professor of Civil Engineering, at the University of Illinois, in introduction to his paper at the Congress of Human Engineering at Ohio State University, from which the following has been abstracted.

The human units under this development of mechanical efficiency have attained a wonderful efficiency in production of more things at cheaper prices. Success in this direction—on which the eyes of the engineers have been fastened—has been accompanied by serious defects of which he is rapidly becoming aware. The fruit in hand has crumbled to ashes. What profits it if the world of *things* is gained to the loss by the many of their higher life?

The Widening Vision

The present unrest among the industrial workers is evident. Many fail to recognize, however, that this is the necessary outgrowth of the work of the engineer concentrated on narrow lines. It has not yet been fully understood that he, the man of ingenuity, has by his inventions caused this state of unrest. Shall we punish him? Shall we do away with his kind? Or, rather, shall we say to him—if by the narrow following of your vision we have fallen into this unhappy state it is for you to look about more broadly, to indicate the way and to act as guide in extricating humanity from this slough of discord. It is your duty—above that of all other men—to have a wider vision, to exercise your ingenuity on broader lines and to plan the road around the insurmountable difficulties.

Engineering of Men

In many industries the investment in machinery and equipment represents roughly 50 per cent of the outlay; the amount expended for labor is approximately equal. The engineer has been educated to think almost exclusively in terms of machinery and equipment. He has been regarded as the expert to whom we turn to secure quicker transportation of raw material and of finished products, to speed up the machinery and to increase output per machine. Absorbed in these details he has apparently overlooked the obvious fact that there is a limit to the effective working of this machinery and that limit is set not by the inventor but by the man who must operate it. Almost any one can now go into the market, buy the latest up-to-date machinery, built in accordance with the ripe experience resulting from long years of experimentation. He can equip his factory or construction forces with the finest labor-saving devices, but after all this is done he may be unable to hold his own or successfully compete with others. This is not because the machinery is imperfect but from the fact that the foreman and laborers are not utilizing these devices with the efficiency pictured by the engineer or inventor. The condition may be typified by an orchestra provided with the best instruments, each man selected without care, and who united produce discord; they are unable to reach a concert pitch. The relative efficiency on the part of the improved machines may be 80 or 90 per cent of perfection, while that from the human side may be as low as 20 per cent.

Here then is a lack of proper balance. It is of no avail to secure 1 per cent or 2 per cent increase by throwing out the old and procuring the better machines if there is a persistent loss ten times as great on the labor side. It is becoming evident that if the engineer is to continue to add to the health, comfort, and prosperity of mankind through inventions, it will be by a larger recognition of the fact that these inventions must aid the men who use them to progress upwards rather than downward to the present unsatisfactory condition where the machine has been exalted above the men.

How can this be done? Is it really the duty of the engineer? Is it not rather that of the statesman or economist? It is easy to shift the responsibility to some other man or profession. Looking the matter squarely in the face, we must admit that of all the types of men and professions the one which purports to lead is that of the men whose business it is to look into the future and to have visions which square in with realities. The lawyer or the statesman is properly concerned with the past, and with the conditions which grow out of it. It is hardly permissible for the man learned in law to consider what the law might or should be; his strength lies rather in ascertaining what the law is. The economist is in much the same position, his concern is with things as they are and while he may discuss what they should be, it has not been a notable part of his training to devise new methods. The engineer, on the other hand, from the very initiation of his technical work is or should be taught not only the fundamental facts but be led to make application of these in new lines and unexplored fields. The crowning events of an engineer's life are those of research, of trying new things and new methods in ways dictated by a thorough understanding of things as they are.

While it is true that the engineer has confined his thought almost exclusively to the materials and forces of construction, yet his experience is bringing out the fact more that human labor is one of the principal forces; that this is governed by laws which he must investigate more thoroughly than he has done in the past and concerning which he must reach a larger understanding. The same training which has made him a success in handling steel and cement must aid him in the far more complicated operations.

How shall this be done? The answer is simple, though the method may be slow and laborious. It is by following the well-established principles and practices of careful observation, of correlation of facts and drawing sound deductions from them. There is nothing mysterious about this investigation. While the laws and application of these laws to human welfare in industry are far more complicated and are subject to more exceptions, yet they are as ascertainable as those which govern the action and reaction of the so-called forces of nature. Such studies may be applied equally well, if not better, in the service of mankind. Our present difficulties are not those growing out of the possibility of knowing and using these laws, but rather of neglect due to concentration of effort on one side only of the problem.

Consider for a moment the time and money now being invested in engineering experiments in some single line as in the perfection of apparatus for electrical lighting, or in the transmission of power, or in the automobile engine. Suppose that an equal or greater amount of money and of scientific skill were concentrated upon one or another of the existing problems of human engineering as contrasted with electrical or chemical. Could we not confidently look forward to a better outcome?

Research in Human Engineering

It is not within the bounds of this paper to attempt to lay out the particular lines of research in "human engineering" nor to predict the outcome of these. It is sufficient to note with satisfaction that engineers are awaking to the fact that they have a duty as well as an opportunity and that they are getting down to specific details. This is illustrated in the increasing number of articles which are appearing in engineering periodicals. The progress is shown also in such work as has been done by the U. S. Reclamation Service, which, organized primarily for the reclamation of arid lands, has found it necessary to go beyond the mere preparation of plans and building of great structures. In studying the efficiency and economy of the results, it has steadily been brought into questions of human relation. Beginning with the necessity of providing medical and surgical aid to its laborers in remote camps, it has taken up one after the other questions of keeping liquor out of camp and of providing a counterpoise in the shape of adequate opportunities for enjoyment. It has taken up not merely the proper feeding, but also the housing of its men and their families and in some cases providing school rooms and lending a hand in social activities which tend to keep the men not only on the job but also at their best.

Results Require Welfare

These and other lines of work were not dreamed of at the time the Reclamation Act was passed. They were regarded as wholly outside the domain of engineering. To-day the responsible man in immediate charge of construction regards it as an essential part of his work, as well as a privilege, to take the initiative, being as inconspicuous as possible in all these matters but always looking to the welfare of the men with whom he is in contact. He appreciates that this

activity is justified or even required by the consideration of turning to useful ends the forces of mankind as well as of nature. He can show, in his final statement of cost compared to output, the economy of expenditure of time and money in ways a generation ago would have been regarded as purely altruistic and inconsequential. We are no longer compelled to defend this new emphasis on the human factor, but on the contrary we may properly apologize for doing too little rather than too much. We now know that the efficiency and economy of results are bound up not alone with properly cared for machinery, but more than this with the welfare of the men and women who use it.

Some Unusual Uses for Gas

Range from Tempering Seconds Finger of a Watch to Heat Treatment of Largest Cannon—Also from Wholesale Hair Drying in Girls' Seminary to Incinerating Bones and Horns of Desert Animals for the Potash Contained in Them

Besides the ordinary domestic routine of lighting, heating and cooking, the applications in other directions are legion, and the manufacturer of such special apparatus is expected to be more or less of an expert in every trade under the sun, writes T. W. Fletcher, chairman of Fletcher, Russell & Company, in the *Gas World* (British). In fact, there is not a single article produced or shaped by the hand of man that requires heating in any large or small degree during its manufacture that has not already been, or could not in the future be, done with advantage by coal gas. From the cradle to the grave, gas is one of the most willing and tractable slaves of mankind.

Using Its Radiant Efficiency.

Having specialized in out-of-the-way uses of gaseous fuel for so many years we have had a unique collection of peculiar problems to deal with.

It is a far call from the heating of ladies' curling tongs or the tempering of the seconds finger of a watch to the bodily treatment of some of our largest naval guns, or, again, from the hatching out of microscopic bacilli to the destruction of the whole carcass of an anthrax-infected ox, yet coal gas has played a most important and useful part in all these processes.

The "utmost radiant efficiency" has been obtained from a giant gas fire for the wholesale drying of the washed tresses of the students of a girls' seminary, while designs have been made for a destructor to deal with the mortal remains of a certain Parsee sect in the Far East.

The bones and horns of wild beasts collected from the African deserts, and also the framework of derelict "ships of the desert" from the caravan routes, have been incinerated for their potash salts, etc., also by means of coal gas.

For Testing Scientific Instruments.

Lost dogs have found their last home in gas-heated crematoria, while many hospitals utilize the same apparatus for destroying bandages, etc.

The preserving and tinning of foodstuffs has been done by means of gas-heated machines, which have dealt with Norwegian sardines, Australian rabbits, Canadian apples, Indian pines, Chinese figs, and other delicacies all over the world, in their own homes.

As the accuracy of gas heating and its superiority over any other agent is now so thoroughly recognized, the standardization and testing of the most delicate scientific instruments, such as the recording of pyrometers, testing of chronometers, tempering of gauges, etc., are now universally done by this means. The production of artificial gems has become a fine art through its agency, while the more nefarious "traders," such as coiners, flash note printers, and burglars, have utilized gas apparatus to a considerable extent, as an inspection of the "thieves' museum" at Scotland Yard will testify.

Water-Heating Problems.

Problems in the water-heating line cover an immense field, and are a most interesting study, but for obvious reasons are usually the simplest to deal with. Aquarium tanks, which have to be regulated to an accurate degree throughout the year, are maintained for delicate and tropical fishes and exotic water plants; diving tanks for stage performers to disport themselves in and smoke or eat under water in comparative comfort so far as bodily warmth is concerned; while the sacred crocodile from the Nile or Ganges is reminded of the temperature of his native waters by means of coal gas during his performance at the hippodrome or zoo.

Immersion fonts for baptismal purposes are commonly heated in the same way; sulphur and other horrors in the way of medicinal waters are raised to the temperature of their natural source, while one of the most difficult problems successfully solved has been the heating of strong brine for baths, etc., without its crystallizing in the heater. The cut-up surface of real ice skating rinks has been rejuvenated by melting the surface with a specially designed burner something after the style of the present pneumatic carpet-sweeper.

Oxidizing of Copper.

To turn again to more solid elements, and taking iron and steel alone, the whole field of processes, from the recovery from the natural ore to the final finishing of the manufactured article, in all their stages have been greatly simplified and more accurate results obtained by means of gas-heated apparatus. I cannot go into details of the manufacture of needles, whale harpoons, hairpins and armor plate for battleships, with all the other iron and steel articles of intermediate sizes included, but all owe something to the original inventor of coal gas.

The pottery and enameling trades turn out their finest work entirely through the accuracy and certainty of gas heating, together with the ability to obtain the necessary atmosphere and regular, even temperature required to produce the most delicate colorings without risk of the deleterious drawbacks so often met with in other forms of heating. Old pottery, lost coloring effects (evidently often accidentally produced originally), ancient glazing and crazing have been accurately reproduced and their processes established; while the latest research work in refractory material investigations and experiments is being done almost entirely with the assistance of gas-heated furnaces.

The oxidizing of copper for ornamental work and reproductions from the antique can be more successfully done by gas than by any other means; while investigations to re-discover some of the dyes which have been lost to the world for centuries are being carried on with the same agency.

Extracting Gold From Old Cigar Bands.

The straightening of walking-sticks and the bending of their handles, and also those of umbrellas and par-

asols, together with the imitation of the making of the rarer canes on more common woods, is generally done by specially designed gas-heated arrangements, while the branding of dead meat, living cattle, beer barrels, packing cases, etc., is also done in the same way.

The complete brazing of all the joints in a bicycle frame by means of the dipping process has a special gas-heated tank designed for the purpose, while tobacco in all its forms is dried, treated and conditioned by means of various specially constructed apparatus. A special form of furnace has also been required to braze the toe pieces to a patent design of shoe for racehorses. Before "war economy" was preached a waste recovery furnace was designed to extract the gold from old cigar bands, hat initials and other forms of extravagances in the way of advertisement where gold lettering was used. As a contrast to this, another was designed for destroying bank notes!

Finally, and to show how completely any single trade is now dependent on gas heating, I give below a list of the processes in the manufacture of glass articles that are now done by this means: Glass melting, annealing, staining and painting, also melting and soldering the leads for same, blowing and sealing of bulbs of scientific instruments and electric light globes, heating moulds, flashing tumbler edges, shaping bottle necks, etc., bending tubes and plates, firing and fixing of signs on plates, secret processes for dealing with aeroplane screens, searchlight lenses, and the eyes of the tanks for the battlefield, silvering mirrors, making glass buttons and beads, also imitating ancient Venetian glass and rediscovering the glassware found in the tombs of Egypt and the ruins of Pompeii.

Other apparatus for ordinary and extraordinary uses would require volumes to describe in detail; they have grown enormously in number since the war began, but out of the many hundreds we have designed and supplied during the past forty years, there is hardly an instance where such an appliance has not been a complete success, and, if it has superseded an older method, has not been more satisfactory, economical and rapid in doing its work.

Failures can only occur where full details of the exact work to be done are withheld or working instructions ignored.

Cost of Excess Packing Friction

(Copyright, 1917, by W. F. Schaphorst)

The function of packing around a piston rod is to save money by preventing steam from leaking out. It is a plausible function. But there are two general classes of packing—good and bad. Both of them may be perfectly steam tight, yet the one may create much more friction than the other. As a result, the power loss due to this friction may develop into a surprising amount per year. If the packing is a "cheap" one, it may be demonstrated that the money lost through its use is sufficient to buy a good packing many times over.

A good test for packing is the "fly wheel test." It is based on the fact that when a fly wheel runs at normal speed, it contains a constant amount of energy. That energy may be computed by use of the formula.

$$E = \frac{W\ V^2}{2g}$$

where W is the weight of the fly wheel rim in pounds, V is the velocity of the rim in feet per second, and g is equal to 32.16.

Now, close the throttle valve of this engine and the fly wheel will continue to run for a while. The greater the friction to be overcome per second, the shorter will be the stopping line. The less the friction the longer the stopping line. If there were no friction to be overcome at all, the fly wheel would keep the engine running forever, and at the original normal speed.

These things being true, it is now clear that a "good" packing will permit the fly wheels to run for a longer time than will a "poor" packing. Bearing these several things in mind, I, therefore, developed a formula that gives the cost of the unnecessary friction per year. The formula is:

Unnecessary expenditure for packing friction per year:

$$\frac{\$ \times W \times V^2 \times N}{17{,}600}\left(\frac{G - P}{G \times P}\right)$$

where

$ is the cost of a horse power hour in dollars.
W = the weight of the fly wheel rim in pounds.
V = velocity of the fly wheel rim in feet per second.
G = the number of seconds required for the fly wheel to come to a dead stop after the throttle valve is closed with the "good" packing in place.
P = the number of seconds required for fly wheel to come to a dead stop after the throttle valve is closed with the "poor" packing in place.
N = number of running hours per year.

For example, if the cost of your power averages $0.013 per horse power per hour; if you run 3,650 hours per year; if the fly wheel weighs 3,000 lb.; if the fly wheel velocity is 5,000 feet per minute, or 83.3 feet per second: if the stopping time with good packing is 75 seconds and with poor packing 68 seconds, what is the cost of the unnecessary friction per year?

Substituting in the formula we get:

$$\frac{\$0.013 \times 3000 \times 83.3 \times 83.3 \times 3650}{17{,}600}\left(\frac{75 - 68}{75 \times 68}\right)$$

$$= \$77.30$$

One can purchase a goodly quantity of packing for $77.30—enough to last for a number of years. A great deal of good can be accomplished with that amount of money. Some readers may say, "It's an absurd amount. Such a loss due to poor packing is impossible from the standpoint of friction alone. There is something wrong with the formula."

The formula, however, is based on good engineering logic, on actual experiments conducted with engines. The writer knows of none better, or this one would not have been given here.—W. F. SCHAPHORST.

Great Quantities of Natural Gas Lost in Louisiana Fields

Engineering feats, comparable in the ingenuity required if not in expenditure of effort with the closing of the Salton Sea, have been called for in recent years to close wild gas wells in Northwestern Louisiana. An immense amount of natural gas has been lost in wells that have gotten beyond control in the Caddo and Red River fields and the loss consists not only in the precious fuel wasted but in the lowering of pressure on the associated oil which is rendered thereby more difficult to recover. Indeed, it is asserted by some that the ultimate yield of oil from a pool is considerably less if the gas is allowed to escape than if it is closed in until as much oil as possible is taken out.

Patents Pertinent to Gas Industry

Automatic Shut Off Valve

Patent No. 1,222,758; described in Patent Office *Gazette*, April 17, 1917, page 689. George C. Hall and Alfred Bradshaw, Calgary, Alberta, Canada. Filed Aug. 30, 1915. Serial No. 48,142. (Cl. 137-92.)

An ordinary globe valve body and disc forms the basis of this automatic cut off valve, with a vertical bracket attached to the side of the body extending beyond the top of the rod which is attached to the disc. At the upper end of the bracket an arm is pivoted. The end immediately over the rod attached to the valve disc is equipped with a weight, a piece of fusible wire being attached to the other end of the rod and the body of the valve. When the fuse wire melts the weight is superimposed upon the valve stem, which closes the valve.

Method of Separating Gas Constituents Utilizes Electric Current

Patent No. 1,221,505; described in Patent Office *Gazette*, April 3, 1917, page 178. Linn Bradley, East Orange, N. J., and Walter August Schmidt, Los Angeles, Cal., assignors to Research Corporation, New York, N. Y. Filed July 23, 1914. Serial No. 852,719. (Cl. 183-114.)

This method consists in injecting into the gas or mixture of gas, solid particles which are capable of reacting with, and which absorb the desired constituent. This forms a cloud or mist of suspended particles, which is precipitated by subjecting the gas containing the cloud or mist to an electric current.

Carbide Feed Self Contained in Bell of Holder

Patent No. 1,221,475; described in Patent Office *Gazette*, April 3, 1917, page 166. Ernest M. Rodebaugh, Long Bottom, Ohio. Original application filed Mar. 27, 1914. Serial No. 827,697. Divided and this application filed May 29, 1915. Serial No. 31,211. (Cl. 48-36.)

In this acetylene generator, a carbide holder has an outlet in the bottom and a filling opening in the top. A valve is hinged within the outlet, with a rod pivotally connected to and supported by the valve. A method for holding the rod pressed down and the rod in a normal open position is provided. A spring is provided within the carbide holder and is connected to the bottom of the holder and to the rod, and which exerts an upward pull upon the rod.

High Pressure Gas Tank Valve Provided with Secondary Valve for Automatic Closing

Patent No. 1,223,899; described in Patent Office *Gazette*, April 24, 1917, page 1117. George M. Parks, Kansas City, Mo., assignor of one-half to Anders Larsen, Kansas City, Mo. Filed Nov. 6, 1915. Serial No. 60,160. (Cl. 220-110.)

In addition to the usual valve for controlling the charging or discharging of high pressure gas cylinders, an easily unseated relief valve is carried by the regular valve. This secondary or relief valve is unseated and opens when the pressure of the tank rises to a predetermined amount, thus guarding against the overcharging of the tank. In addition a disc, carried by the relief valve, ruptures and permits gas to escape if the relief valve fails to operate.

Ditching Machine Provided with Shovel Scraper

Patent No. 1,222,754; described in Patent Office *Gazette*, April 17, 1917, page 687. Frank H. Gerdeman, Findlay, Ohio. Filed Dec. 23, 1914. Serial No. 878,649. (Cl. 37-29.)

In this ditching machine a wheel is mounted upon a frame, with a series of pivoted shovels carried by the wheel. A scraper is also pivoted upon the frame and is arranged to scrape in succession the interior of the shovels.

Respirating Device Provided with Oxygen Tank and Purifying Device

Patent No. 1,222,683; described in Patent Office *Gazette*, April 17, 1917, page 663. Detlef Karl Heinrich Schumann, Hamburg, Germany. Filed Dec. 8, 1913. Serial No. 805,347. (Cl. 128-13.)

This respirator comprises an air pipe, a removable purifying device and an oxygen supply tank. A pipe normally connects the tank with the air pipe. A by-pass connects the oxygen tank and the purifying device, and excludes outside air when the purifying device is removed.

Method and Apparatus for Fractionating Hydrocarbons

Patent No. 1,222,402; described in Patent Office *Gazette*, April 10, 1917, page 522. Leon E. Hirt, Charleston, W. Va., Filed July 21, 1915. Serial No. 41,109. (Cl. 204-64.)

The method consists in subjecting an oil in the form of a spray or mist to the action of an electric arc within a closed retort. A controllable pressure is maintained in the retort, and the spray of oil is reduced to vapor. These are condensed and carried off.

Barricade Holders Provided for Street Work

Patent No. 1,222,020; described in Patent Office *Gazette*, April 10, 1917, page 388. Frank W. Myers, Owosso, Mich. Filed Oct. 30, 1916. Serial No. 128,590. (Cl. 256-64.)

A wood body has metal strips secured to its sides, with loops formed above the body, and with a clamping screw and nut mounted in the upper end of the upper loop. Triangular sockets are fastened to each side of the body, with legs removably mounted in the sockets. Barricade timbers are mounted in the loops.

Gas Regulating Valve

Patent No. 1,221,660; described in Patent Office *Gazette*, April 3, 1917, page 228. Arthur W. Bice, Windsor, Ontario, Canada. Filed Jan. 12, 1916. Serial No. 72,083. (Cl. 67-121.)

This cock consists of a nipple having a jet opening in the burner end. An inner sleeve is adjustable upon the nipple and provides an annular gas passage around the end of, and communicates with, the interior of the nipple through lateral passages. An outer sleeve is adjustable upon the inner sleeve, which also forms an annular gas passage between the sleeves, and which also communicates with the interior of the nipple. The sleeves are separately adjustable to open and close the passages, in order to regulate the flow of gas.

AMERICAN GAS ENGINEERING JOURNAL

FIFTY-NINTH YEAR

Published Weekly by
AMERICAN GAS LIGHT JOURNAL, INC.
42 Pine Street, New York, N. Y.

ELBERT P. CALLENDER, President
STANTON G. KRAKE, Vice-President
FREDERICK A. SOUTHWORTH, Secy.-Treas.

EUGENE C. MILES, Editor

WESTERN MANAGER
E. B. FRITZ

CHICAGO OFFICE
537 So. Dearborn St.

Subscription $3.00 per year, including postage in the United States, Mexico, Cuba, Porto Rico, Hawaii or the Philippines.
In Canada, $4.00. Foreign, $5.00
Single Copies, 10 Cents.

Entered at the Post Office, New York City, as Second Class Matter.

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Gas Works Construction in War Time

Some deluded individuals in the gas industry persist in the belief that on account of the high prices of materials and labor gas works construction must of necessity stagnate and mark time. The AMERICAN GAS ENGINEERING JOURNAL has contended consistently that such a condition would be impossible. High prices or not, new construction in gas works must go on. The demands for gas under normal conditions in any growing, and quite frequently in non-growing, community increase regularly. Under the stimulus of war-time industrial activity in localities the demand must spring up mushroom-like almost overnight.

Take those localities where great cantonments will be located. The gas companies at these points are apt to be called upon to meet additional maximum demands that might rise beyond a hundred thousand cubic feet hourly.

Do not overlook, either, the fact that great quantities of gas will be needed for aviation purposes—balloons, etc. Even these loads will not be inconsiderable.

Above all consider the increased use of gas for industrial purposes; for the manufacture of munitions and the innumerable details of equipment the military service and the shipbuilding program will require.

Where are these millions of cubic feet of additional gas to come from. From existing plants? That would be to presuppose our present loads will decrease, a dangerously false assumption. Instead they too will increase, even if we cut off all efforts to obtain or encourage new business. The increased use of gas for house heating will alone assure this condition.

Dismiss all thought of a cessation of construction actively in the gas field. The demand for gas will not permit of such a condition, and, as the increased demand will be largely a part and parcel of the military activity of the Nation, no terrestrial power can stand in the way of the construction necessary to meet it.

Discouraging Effort in Small-Consumption-Appliance Sales in Our Anxiety to Secure Large-Consumption Installations

There is no more promising field for securing new business before the gas industry to-day than that represented in commercial lighting. Few will dispute this assertion, yet how little effort relatively is being made to secure such installations.

It has been said that new business managers are hesitant about going after commercial lighting business. The "higher-ups," it is said judge their value in terms of expense of upkeep of their department as against total quantity of increased output.

An industrial fuel installation consumes many thousand cubic feet of gas and demands proportionally little looking after. A commercial lighting installation to be satisfactory requires proportionately a very large

amount of maintenance. Therefore the whole attention of the department is concentrated on the fuel installations.

If these statements are true with regard to any considerable number of companies then there is existent in the gas industry a lamentably large amount of short-sightedness. It is almost a case of running fifty miles to pick up a twenty-dollar gold piece, passing deliberately in our haste a hundred five dollar gold pieces that lie at our very feet.

The gas industry needs for its healthful development all the new business it can obtain. Whether that business be home lighting, commercial lighting, industrial fuel or cooking, it should strive to obtain every item of any kind that is obtainable, regardless of relative costs, provided that in the long run there is a reasonable percentage of profit in such item of business.

There is no room for theorizing or convention-floor discussion on so obvious a matter. The company which thinks otherwise is tempting disaster.

Engineering the Best Paid Profession

One of the country's foremost newspapers has prophesied that engineering will be the best paid profession for at least ten years after the war. On this basis, it has taken upon itself the responsibility of advising young men by the wholesale to take up technical studies.

Isham Randolph is inclined to believe the newspaper is too optimistic, and, if we accept past standards and conditions as a criterion, the AMERICAN GAS ENGINEERING JOURNAL must agree with him. His words, "We, who know that the engineer is generally regarded as a necessary nuisance who has barely been granted a living wage; we who know that there are engineers whose education has cost them thousands of dollars; men who have mastered the science and whose compensation for knowledge, experience and faithful work is on the scale of wages paid to barely skilled labor, can hardly believe that even war will bring him into his own," seem to carry a greater degree of pessimism than we can concur in, but it must be remembered that they are the result of years of experience that antedate the experiences of most of us. Yet it must be conceded that they are—unfortunately—borne out by the history of the past and conditions of the present.

If the war has the effect of putting compensation standards for engineers on a more just basis, as we believe it will, though not to the extent indicated—then indeed we will know that some good at least will have ensued from so great a calamity.

We do not believe that in general engineers greatly desire that their's should necessarily be the "best-paid" profession. There are other compensations in this class of work than that of mere money getting.

We may speak from a prejudiced mind, but we sincerely believe that law, for example, is a drab and uninteresting work as compared with engineering. The medical profession has a tense interest attached to it to one who delights in exercising his emotions and exults in the sense of triumph or depths of despair that accompany success or failure in attempting some seemingly impossible task. But, comparing the mediocre physician or surgeon with the mediocre engineer, we believe that the advantage in interest in the opportunities that present themselves is all on the side of the latter.

But there are material considerations that must have weight. The engineer cannot, if he is a right-thinking man, consider only himself. He, too, has obligations, family and others, that justly cannot be ignored. In the past and in the present, he has been tragically inadequately compensated for the work he has done. The effect has not only hit him, but his children as well. At least he should be paid at such rates as to permit him to live in a manner proportionate to his tastes and education, and lay sufficient aside to be assured of financial independence in the waning years of his life.

Standardization of Appliances

Standardization has become a by-word. That it required the stress and strain of war-time conditions to make clear to the world at large the wastefulness of the practice of building cargo-carrier ships to individual designs is but an additional evidence of the obvious stupidities that frequently result from the headlong rush of modern business.

In the waterworks field there has recently been quite a flurry aroused over a supposedly apparent reluctance on the part of the manufacturers of cast-iron pipe to enthusiastically respond to a change of specifications to be adopted by the two big waterworks associations jointly. The assembled waterworks men with blissful forgetfulness of the fact that changes in patterns cost considerable sums of money to the manufacturer, and that once the changes were made he could not be assured that the biggest buyers in the field would adhere to them, became greatly exercised over his apparent lack of consideration of the weight of engineering wisdom as represented in them. But the pipe manufacturer had been bitten before by lack of real standardization. With trustful confidence he had equipped himself to manufacture both to New England Waterworks Association and American Waterworks Association specifications; then found that he was by no means equipped to meet the market. Large buyers made their own specifications, and even these changed from period to period to conform to notions of changing chief engineers. The cast-iron pipe manufacturer considers, and rightfully, that the engineer should be able to settle upon a specification that would be acceptable to all association members whether they be the chief engineers for large companies or small. He has found out to his cost that lack of standardization is expensive—and only too frequently unnecessary.

A manufacturer of gas heaters has supplied us with the somewhat surprising information that he is building five heaters from one design to conform to various gas companies' specifications. Doubtless an inquiry among manufacturers of other appliances would reveal similar conditions.

If standardization is an economy in ship-building, it is also an economy in manufacturing gas-using appliances. By all means, in these days of high costs, let us save where we can by eliminating some of these obviously wasteful methods of the past.

Faucet on Street Tempts Passers-by to Convince Themselves of Ready Service of Gas Water Heater

Most people are from Missouri, and the best way to interest them in anything is to "show" them in a convincing manner the particular merits of the contrivance; or better yet, let them prove it for themselves. This was the principle upon which the Portland (Ore.) Gas Company arranged a striking demonstration of a thermostat.

The large window was floored and backed with yellow cloth, over which was thrown a scarf of blue silk. In the centre was a gas heater, and a red arrow, hung from the ceiling, pointed to the thermostat, saying: "The thermostat controls the flow of gas." Other cards, set about, advised: "Cold water made hot at the turn of a faucet," "Do you know the joy of hot water in an endless stream? Get a heater," "Have hot water all summer without the trouble of a hot fire," "Why be without an abundance of hot water ready at all times—a gas heater will furnish plenty of hot water when and where you want it." Painted on a card was the picture of a clown carrying a teakettle of hot water. "Don't do it the clown's way—install a tank heater and enjoy solid comfort—inexpensive hot water all over the house."

Having *told* the public the merits of this thermostat, the firm now proceeded to let them *prove* it. Outside the building was run a pipe with faucet attachment, running from the heater, together with an enamel bowl and waste pipe to carry away the water. Above the arrangement was a card:

MERELY TURN THE FAUCET
Fresh water heats instantly, cheaply, and in any quantity.

It was so easy to do this that scores availed themselves of the opportunity and the hot water that at once gushed forth was a convincing proof of the efficacy of the device. It likewise gave more publicity than any other form of advertising, for the merits of it were brought to the attention not only of the person who turned on the faucet, but of all who happened to be passing by.

W. B. STODDARD.

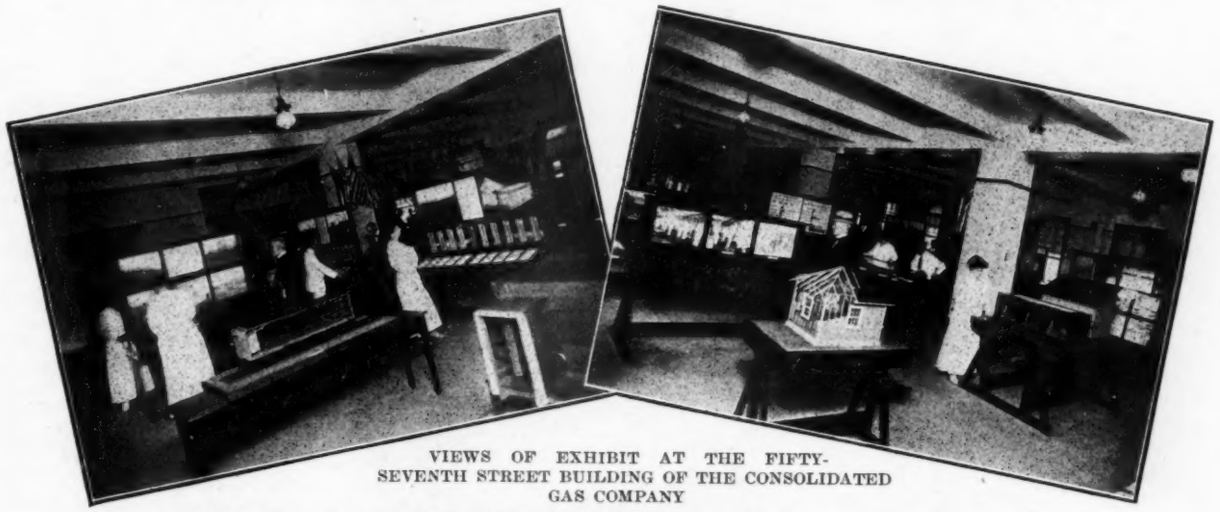
Production of Coal in the United States in 1915 and 1916, Compiled by C. E. Lesher, United States Geological Survey, Department of the Interior

State	1915			1916		
	Total Quantity (Net Tons)	Number of Employees	Average Number of Days Worked	Total Quantity (Net Tons)	Number of Employees	Average Number of Days Worked
Alabama	14,927,937	22,591	223	18,086,197	25,308	262
Alaska	1,400	.....	...	13,073	83	179
Arkansas	1,652,106	3,751	149	1,994,915	3,772	184
California, Idaho, and Nevada	12,503	36	285	*a* 7,240	18	188
Colorado	8,624,980	12,372	194	10,484,237	13,104	233
Georgia	134,496	368	187	173,554	411	280
Illinois	58,829,576	75,610	179	66,195,336	75,538	198
Indiana	17,006,152	22,777	179	20,093,528	23,965	187
Iowa	7,614,143	15,549	220	7,260,800	14,443	202
Kansas	6,824,474	13,260	184	6,881,455	12,132	204
Kentucky	21,361,674	27,960	186	25,393,997	31,222	208
Maryland	4,180,477	5,664	242	4,460,046	5,633	256
Michigan	1,156,138	2,569	198	1,180,360	2,535	216
Missouri	3,811,593	9,173	186	4,742,146	9,654	207
Montana	2,789,755	3,158	201	3,632,527	3,781	244
New Mexico	3,817,940	4,205	262	3,793,011	4,522	292
North Dakota	528,078	590	219	634,912	714	244
Ohio	22,434,691	40,053	142	34,728,219	41,394	197
Oklahoma	3,693,580	8,457	167	3,608,011	7,800	178
Oregon	39,231	151	206	42,592	106	236
Pennsylvania, bituminous	157,955,137	174,593	226	170,295,424	168,212	259
South Dakota	10,593	35	155	8,886	38	145
Tennessee	5,730,361	8,948	220	6,137,449	9,211	239
Texas	2,088,908	5,087	233	1,987,503	4,481	218
Utah	3,108,715	3,564	208	3,567,428	3,129	288
Virginia	8,122,596	8,959	235	9,707,474	9,777	272
Washington	2,429,095	4,850	169	3,038,588	4,797	217
West Virginia	77,184,069	75,882	208	86,460,127	78,067	237
Wyoming	6,554,028	7,244	201	7,910,647	7,265	248
Total bituminous	442,624,426	557,456	203	502,519,682	561,102	230
Pennsylvania, anthracite	88,995,061	176,552	230	87,578,493	159,869	253
Grand Total	531,619,487	734,008	209	590,098,175	720,971	235

a No coal was produced in Nevada in 1916.

News of the Gas Industry

Consolidated Gas Company of New York Affiliates with Government in Canning and Preserving Exhibit



VIEWS OF EXHIBIT AT THE FIFTY-SEVENTH STREET BUILDING OF THE CONSOLIDATED GAS COMPANY

Above: Part of Government Exhibit Showing Prof. F. Lamson Scribner, Chief Expert of Exhibits, Dept. of Agriculture, Washington, D. C., and Some of His Assistants. Below: (Left) Visitors Writing Their Names in Book with Request for Extra Government Bulletins; Meter Shop Orchestra in Far Right Hand Corner. (Right) Lectures Given Every Day

Contradictory Statement Regarding Special Consideration of Drafted Technical School Students

The statement made in the last issue of the AMERICAN GAS ENGINEERING JOURNAL that students in engineering courses at universities and technical schools would be subject to special consideration in the execution of the draft law has been discredited by the latest news received.

After P. P. Claxton, United States Commissioner of Education, had received and distributed the information he then received a notice from Secretary Baker stating that the Secretary had been laboring under a mistake when he gave out the original information, and that the notice had not been examined with sufficient care.

THE UNITED GAS IMPROVEMENT COMPANY has announced the change of address of its chemical department laboratory to 319 Arch Street, Philadelphia.

Large Gas Contract on Pacific Coast

The Western States Gas & Electric Company has closed one of the largest single gas contracts on the Pacific coast, according to H. M. Byllesby & Company. Upward of 4,000,000 ft. of gas a month will be supplied to the Holt Manufacturing Company at Stockton, Cal., for the purpose of testing tractor engines displacing petroleum distillate formerly used. Monthly consumption of gas by the Holt factory may reach 10,000,000 ft. a month.

Largest Safety and Sanitation Exposition and Congress Ever Held to Take Place in New York September 10-15

In view of the changed conditions that are being brought about in numerous factories by the National draft the matter of safety of employees, especially novices who are to take the places of those who enlist, has become a national problem of considerable importance and with this idea foremost in mind a huge Safety and Sanitation Congress has been called to take place in New York City September 10-15. It will be the largest congress of this nature ever held, and delegates from all over the world will attend to discuss matters pertaining to the promotion and standardization of safety methods in factories, railroads and the various industries in which hazardous occupations are found.

Coincident with the congress there will be staged the largest Safety and Sanitation Exposition in history, three large floors of the Grand Central Palace being used, the National Safety Council and the American Museum of Safety co-operating in the work. Thousands of safety devices and demonstrations of accident prevention will be on view. The exposition will be open to the public for one week, and it is expected that it will result in at least a thousand new members being enrolled, who will promise to conform to standards urged by the council.

Victory for the Allies is more dependent on safety among our various industries than the average person imagines. Not only is this true of munition plants where many bad explosions have occurred, either through lack of precaution or carelessness but also in the less hazardous industries. The disability of a single skilled workman interrupts the factory's routine materially, and much of America's success in assisting in winning the war will depend upon her ability in delivering the goods necessary for the soldiers at the front and to deliver them on time.

An interesting series of exhibits will be that showing how the lives of our soldiers and sailors are being guarded as efficiently as possible under the extraordinary conditions the present war has developed. Demonstrations of the weird-looking gas mask for contending against suffocating and lachrymose gases, the various types of camouflage, or methods of painting scenery and arranging foliage so as to hide batteries and transports to deceive the enemy, and the modern sanitary ideas in vogue at the war hospitals should form a tremendously interesting exhibition. Several dozen reels of motion picture film, showing the operation of safety devices and the dangers of neglecting these precautions, are to be shown daily. It is believed that this exposition will have an excellent effect upon the thousands of factory employees who will have an opportunity to see it.

Co-operation of National Committee on Gas & Electric Service Acknowledged by War Department

The National Committee on Gas and Electric Service has been actively co-operating with the Advisory Commission of the Council of National Defense and with a number of the departments of the Government that are actively engaged in various measures for the prosecution of the war.

The committee has been able through its close touch with the gas and electric utility companies to be of special service to the Quartermaster General's Department in connection with the troop cantonments and its chairman, J. W. Lieb, has received the attached letter from Colonel I. W. Littell, expressing appreciation of its services.

COPY

WAR DEPARTMENT
OFFICE OF THE QUARTERMASTER GENERAL OF THE ARMY,
WASHINGTON

July 31, 1917.

No. CR-E

From: Officer in Charge of Cantonment Construction.

To: National Committee on Gas & Electric Service, Munsey Building, Washington, D. C.

Subject: Service rendered by your Committee in connection with cantonments.

1. This office wishes to express its appreciation of the very valuable service rendered by your Committee in connection with solving the problem of obtaining electric power and gas supply where required for the cantonments for the National Army. Due to the information furnished by your Committee, a large amount of investment in temporary power plants has been saved to the government.

2. Time did not permit using your services in connection with the National Guard Camps in the same manner as they were used in connection with the National Army Cantonments, but even under these circumstances your services have proven very valuable in connection with the National Guard work.

3. This office also wishes to express its appreciation of the uniform courtesy and efficiency of your local representatives.

By authority of the Secretary of War:
(Signed) I. W. LITTELL,
Colonel, Quartermaster Corps,
In charge of Cantonment Construction.

New Coke Oven Corporation Takes Over the Otto Coking Company

Announcement is made that the Wilputte Coke Oven Corporation has taken over the organization formerly operated by the Otto Coking Company, Inc., and will build the Wilputte Regenerative By-Product Coke Oven.

The new company is financed entirely by American capital. Louis Wilputte, the well-known coke oven engineer, is president and general manager, and the engineering and purchasing departments have been taken over in toto.

A contract for eighty Wilputte ovens has just been awarded to the Wilputte Corporation by the Steel Company of Canada, at Hamilton, Ontario, and the new plant will be complete with by-product plant and coal and coke handling apparatus. Work has been started and the plant will be completed by December, 1918.

The Wilputte Regenerative By-Product Coke Oven is one of the latest developments in coke ovens and the new type has been installed or is under construction at the following plants: Mitsubishi Goshi Kaisha, Kenjiho, Japan, 50 ovens; Coal Products Manufacturing Company, Joliet, Ill., 18 ovens; Tata Iron & Steel Company, Sakchi, India, 200 ovens; Woodward Iron Company, Woodward, Ala., 60 ovens.

The Wilputte company will also build benzol apparatus and plants of its construction are now in operation at Lackawanna Steel Company, Lackawanna, N. Y.; Republic Iron & Steel Company, Youngstown, O.; Citizens' Gas Company, Indianapolis, Ind., and Laclede Gas Light Company, St. Louis, Mo.

Indiana Gas Association Withdraws Heat Unit Petition

The Indiana Gas Association has withdrawn its petition from before the public service commission for authority to decrease the standard for heat units for all members of the organization. It is understood that the individual members of the association will file petitions asking such authority, or that the association will file another petition, drawn in different form from that which was presented originally to the commission.

The original petition sought authority to decrease the British thermal units standard in Indiana from 600 to 550. The commission, it is understood, will follow the same procedure with the gas companies of the state as with the electric companies, so that no violation of the word of the Indiana utility statute will be possible. The filing of the petition by the gas association was declared illegal by attorneys opposing it, for the reason that the Indiana utility law does not recognize an association of utilities but only the utilities themselves as possible "persons in court" before the commission.

New Corporation Organized in Massachusetts

A new corporation, the New England Fuel & Transportation Company, at Boston, Mass., has been organized, taking over the property and business of the New England Gas & Coke Company, the Boston Towboat Company and the Federal Coal & Coke Company, and all the property and business of the New England Coal & Coke Company except that of purchasing and selling coal, which is continued under the present name. All the stock in the latter corporation is owned by the new corporation. The properties consolidated as of June 30, 1917.

The officers are: James L. Richards, chairman board of directors; Robert Grant, president; Edward Page, first vice-president; W. E. McKay, second vice-president; E. M. Richards, treasurer; H. C. French, assistant treasurer; H. S. Lyons, secretary; A. S. Bull, assistant secretary; M. E. Wilbur, auditor.

The New England Fuel & Transportation Company is closely allied with the Boston Consolidated Gas Company, Mr. Richards being at the head of both corporations.

Gas Managers Visit Welsbach Plant

Gas managers throughout the country are daily availing themselves of the opportunity of visiting the gas mantle factory of the Welsbach Company.

To look for two hours at the twenty-five hundred employees busily engaged making one hundred and seventy-five thousand mantles per day cannot but impress upon the mind of the gas manager the thought as expressed by a recent visitor, "Evidently there is a greater future for gas lighting than I have permitted myself to believe. The Welsbach Company seemingly looks with great confidence to the future, so I guess it's up to us gas men to get busy and do our part."

A GROUP FROM THE NEW ENGLAND SECTION ON THEIR VISIT TO THE WELSBACH PLANT

Reading from left to right, top row: A. B. Burr, New Haven Gas Light Co., New Haven, Conn.; J. P. Osterhoudt, Welsbach Gas Lamp Company, Schenectady, N. Y.; W. C. Riverburgh, Kingston Gas & Electric Co., Kingston, N. Y.

Bottom row: R. F. Whitney, People's Gas & Electric Co., Oswego, N. Y.; W. G. Furlong, Municipal Gas Co., Albany, N. Y.; E. S. Chapin, Welsbach Gas Lamp Co., New York City; H. L. Barnes, Hartford City Gas Light Co., Hartford, Conn.

Visitors are always cordially welcome at this new million-dollar plant and every effort is made to make their visit entertaining. Located on the Delaware River below Camden, it is easily and quickly reached from Philadelphia. The company makes a practice of meeting visitors at the Camden ferry with an automobile when notified from Philadelphia.

Work of Storage Committee Needs Co-operation of All Business Men to Facilitate Transportation During War

Extraordinary conditions prevailing during the war bring producers and manufacturers to face three great demands: first, to develop storage facilities at points of production to avoid congestion in manufacture; second, to develop such facilities for finished goods near the point of consumption or shipment abroad in order to minimize the need for railroad cars; and third, in general to create conditions under which railroad cars will not be used for storage purposes.

The Council of National Defense, recognizing these very real problems, has for some time had at work upon them a special committee, known as the Council's Storage Committee. Regarding the work of this special Committee a committee of the Chamber of Commerce of the United States which is co-operating with the Council of National Defense has issued a special bulletin.

The Storage Committee has been developing the use of motor trucks for short hauls in order to release freight cars for the longer ones. Railroad cars have frequently been used in cities to transport goods only a few blocks, it is said. In Europe to-day motor trucks are used in many places for all haulage under forty miles. Now that our demand upon the railroads is so great we are told no time is to be lost in making use of the opportunities presented by the motor trucks for short haul.

Training of Men for Storage Work

Other efforts of the Storage Committee have resulted in special courses training men for work in handling stores. Such courses are now being given at the Universities of Harvard, Pennsylvania, Michigan, Wisconsin, Dartmouth, Chicago, Northwestern, Georgia, Washington, Columbia and Illinois. Nearly one thousand men now attending or who have attended these courses have enlisted in the government service for the period of the war.

The request is made therefore of all member associations of the Chamber of Commerce of the United States interested in this problem to appoint competent and energetic committees to act in this connection

and to send the names of the members of such committees to the committee of which Mr. Catchings is the chairman and to the Storage Committee of the Council of National Defense at Washington.

There is much, it is said, for such committees to do. They can promote discussion among business men and bring about an early understanding that there is a storage problem; they can show what this problem involves. Among other things, reports should be made to the storage committee of all onerous and avoidable conditions regarding packing and storage in connection with both government and private contracts. Suggestions should also be made regarding baling and compressed or bulk packing in any industries within the view of such committees. Efforts should be made to develop local storage facilities to meet the extraordinary requirements of wartime business.

NOTHING LESS THAN A CAR

Furthermore, steps should be taken to eliminate less than car load shipment by combining such shipments for many manufacturers in a locality and by establishing centers for distributing by truck shipments received in car lots and for receiving goods in a similar manner for outbound movement in car lots. Effort should also be made to bring about the loading of railroad cars to full car capacity. Where such loading is prevented by trade customs, which establish the unit of an order at less than maximum car capacity, steps should be taken to change these customs so that the use of cars will not be unduly restricted.

Gas Franchise Granted at Thief River Falls, Minn.

The city council of Thief River Falls has granted a gas franchise to William Glenn of Sheldon, Iowa, representing the Public Construction Company of Minneapolis, for a period of twenty-five years. According to Glenn, plant construction will be started as soon as all the papers are signed and a considerable portion of the mains will be laid before cold weather sets in.

A maximum rate of $1.60 per 1,000 ft. is stipulated in the ordinance, which also retains for the city the privilege to purchase the plant at five-year intervals. At such times the rates are to be subject to readjustment.

War Work of the British Commercial Gas Association

The official report of the work done by the British Commercial Gas Association to assist the British Government in its prosecution of the war is printed below as it will appear in the September issue of the *Monthly Bulletin* of the National Commercial Gas Association, to which this journal is indebted for the report.

The National Commercial Gas Association takes pleasure in making public and in warmly commending this splendidly organized procedure. Our Ally, Great Britain, is fortunate in the possession of so capable and public-spirited an organization.

What the Gas Industry Through Its Representative Publicity Organization, the British Commercial Gas Association, and Its Other Component Bodies, Has Done to Assist the Government During the War

A short preliminary explanation is necessary. The British Commercial Gas Association was already established and had been in working order for some two and one-half years before the war. Composed of representatives of gas manufacturing and supply undertakings, both company and corporation—that is to say, of directors of companies, committee chairmen, engineers, and administrators—and of representatives of gas appliance manufacturing firms, it was uniquely fitted to act as an emergency organization for war service and to correlate individual energy and initiative with the needs of the time with a success that could hardly have been attained had there been no such representative body in the gas industry.

The following table gives a general idea of the functions and work of the Association, which will be subsequently set out in more detail under their various headings:

I.—INFORMATION BUREAU.

From the outbreak of war the Association declared itself to be as it were a clearing-house for ideas coming both from within and from without the industry, and also ready to furnish information on all points connected with problems of war conditions to—

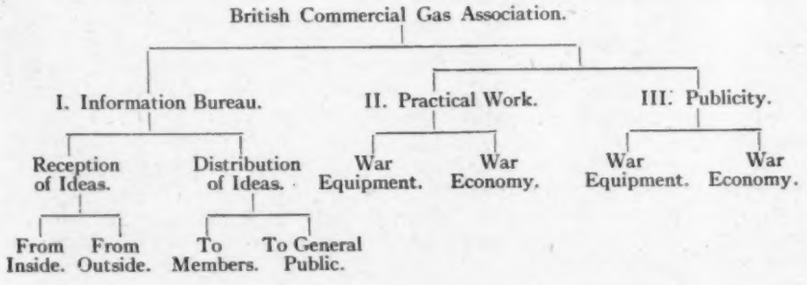
1. Members of the Association.
2. Non-members of the Association, but members of the gas industry.
3. Manufacturers of munitions, army clothing, etc.
4. Other members of the general public—municipal authorities, public bodies, doctors, architects, teachers, housewives, etc. For instance, between 13,000 and 14,000 copies of "A Thousand and One Uses for Gas" have been distributed per month in suitable quarters.
5. Governmental departments.

Under this last heading (5) very valuable work was done in co-operation with Governmental departments in regard to

a. The enlistment of non-essential men (who were, it may be remarked, in the majority of cases allowed financial support by their employers according to circumstances);
b. Securing for the industry the reservation of essential men; and
c. The substitution of female and other labor.

Another example of similar co-operation is to be found in the negotiations carried out through the representative deputations or by the chief officers of the various organizations with the "Priority Branch of the Ministry of Munitions" with a view to securing materials and labor for the manufacture of essential gas plant and apparatus in such a manner as best to fit in with the demands of the services, fluctuating supplies, etc.

(*Continued on page* 164)



Edward Cowin Retires from Commercial Department of the People's Gas Light & Coke Company

In the retiring of Edward Cowin from the hotel and restaurant division of the commercial department of the People's Gas Light & Coke Company, Chicago, the gas industry has lost one of the pioneers of an important and interesting phase of its business—selling modern service and equipment to the foreigner, the backwoodsman, the illiterate.

In fact, Mr. Cowin might well be termed the discoverer of this field of gas consumers and the inventor of the method of bridging the gap between the seller who speaks only English and the buyer who not only speaks no English but can read no language, not even that of his native land.

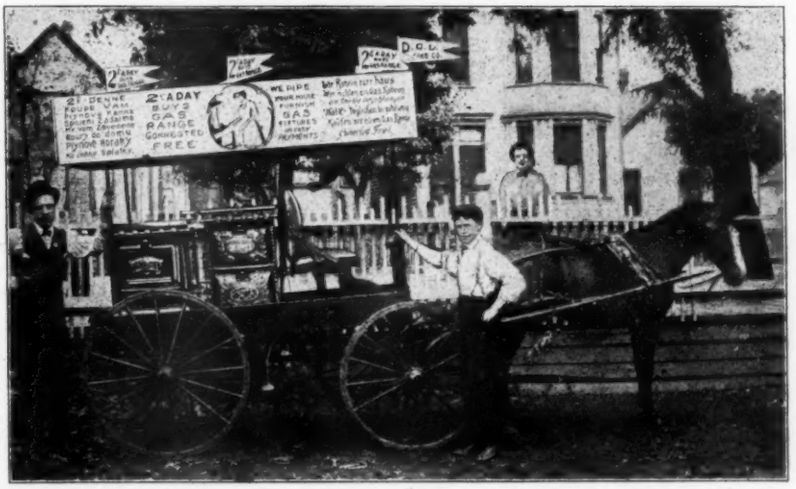
The story is told of an Irishman who found his regiment encamped near a unit of French soldiers. Pat wanted to establish business relations with the Frenchmen, but his knowledge of their language was almost nil. Nothing daunted by this fact he approached one of the Frenchmen with a broad smile and a "Good morning, parlez vous Francais?"

"Oui, oui," said the Frenchman.

"Well, then will you lind me the loan of a gridiron?" said Pat, and he got it.

Cowin's method was similarly simple and direct. Away back in the early years of the twentieth century—no one seems to remember the exact date—Cowin conceived the idea of selling gas ranges to a section of Chicago's population that had not been reached to any extent by the gas company's agents before. Cowin spoke only English. His customers-to-be spoke only Austrian, Belgian, Bohemian, Bulgarian, Chinese, Croatian, Finnish, French, German, Greek, Hungarian, Japanese, Lithuanian, Norwegian, Polish, Rumanian, Russian, Serbian, Spanish, Swedish and Swiss, respectively.

These all looked like good prospects to "Ed" and so he went after them. Laying his scheme before the sales department of the company he received approval for it and was appointed a solicitor. He placed a couple of gas stoves on a little old one-horse shay, drove it into the heart of the foreign quarter, picked out a lamp-post at random and connected his gas range to its supply pipe. Before he had completed the connection a crowd, not unlike that which built the Tower of Babel, gathered around Cowin to watch developments.



THE ONE-HORSE SHAY THAT GAVE PRACTICAL GAS RANGE DEMONSTRATIONS IN CHICAGO FOREIGN QUARTER

Some had never seen a gas range before. Others regarded it as a luxury not to be dreamed of by them. Still others stood off at a distance prepared to run should the contrivance attached to the lamp-post become unruly and perhaps explode. All that exploded, however, were the theories of these foreigners that a gas range was a luxury; that it was dangerous or that its use required any skill.

Cowin soon had his demonstration under way. He showed the foreigners how to light the range, how to put the fire out and how to feel the warmth of the oven by putting their hands in it. He spoke to them with his hands and his eyes as much as with his tongue and by pantomime sold his first range in the foreign section. That one range and its owner thereafter virtually took care of the company's business in that section. Cowin moved on a few blocks further, attached his range to another lamp-post and after demonstration introduced the gas range in a second foreign section.

In time Cowin and the gas company improved their methods of combating the ignorance and prejudice of the foreign-born. Cowin eventually abandoned his one-horse shay and became one of the company's most valuable salesmen. On June 1, this year, he was placed on the retired list by the Annuity Board. The work he started so crudely is now being carried on scientifically by the advertising department of the gas company of which John F. Weedon is the head.

The scope of the company's business in the foreign sections of Chicago may be visualized when it is known that the company advertises regularly in forty foreign language newspapers printed in fifteen different tongues, and that approximately 1,500,000 persons, or almost half of Chicago's population, are either foreign born or the offsprings of foreign-born parents, according to the Federal census report of 1910.

Among the foreign language newspapers in which the People's company advertisements appear are 6 German, 2 Hungarian, 2 Serbian, 6 Jewish, 5 Polish, 3 Lithuanian, 1 Slavonic, 3 Greek, 2 Bohemian, 3 Swedish, 3 Italian, 1 French, 1 Norwegian, 1 Danish and 1 Croatian. A staff of interpreters is ready at short notice to translate the English copy into all these languages and so practically the same advertisements appearing in the English press are read simultaneously by fifteen other nationalities.

"An interesting feature of our foreign language advertising," Mr. Weedon points out, "is that the pictures look alike in all the languages."

THE BRIGHT GAS MANTLE COMPANY of Chicago has filed a petition in the courts of that city asking that George Bohner, trading as the Brilliant Gas Lamp & Bohner Manufacturing Company, also of that city, be adjudged bankrupt. The petitioner presents a claim for $515.

THE WELSBACH STREET LIGHTING COMPANY of Chicago has purchased a warehouse at Seventy-sixth Street and South Chicago Avenue.

(*Continued from page* 162)

II.—The Association's Organization for Practical Work

by various branches of the industry resulted in the following measures designed to aid in—

A. The Production of War Equipment.

B. The Furtherance of War Economy.

A. War Equipment.

a. The conversion of old factories by the adaptation of plant—
1. From peace to war conditions.
2. From solid to gaseous fuel.

b. The equipment of new factories on modern lines designed to speed up output.

c. The arrangement of exhibitions and demonstrations of gas furnaces and other appliances, and of experimental stations in works, show-rooms, etc., to which any manufacturer of war equipment (whether previously using gas or not) could freely bring any kind of raw material for experimental treatment in existing gas furnaces, etc., with a view to the evolution of new varieties of such apparatus specially suited to his particular industry.

d. The equipment (in many cases free of, or at a reduced rate of, charge and at the very shortest notice) of—
Field camps and kitchens,
Billets,
Y. M. C. A. huts, etc.,
Hospitals (permanent and temporary),
Refugee homes,
Factory canteens, etc., etc.

e. The organization, in co-operation with leading scientific bodies, of illustrated lantern lectures on the various branches of possible gas service in war time to be delivered before those learned societies by leading men in the gas industry.

B. War Economy.

This section can be further sub-divided under the following heads—
1. Fuel.
2. Food.
3. Life.

1. *Fuel.*

a. The arrangement and free equipment in gas showrooms or other suitable places of demonstrations on—
i. Schemes of economizing fuel.
ii. How to make the best use of the gas cooker.

b. The arrangement of showroom window exhibits—as, for example, of
i. The valuable by-products obtained from the destructive distillation of coal.
ii. Specimen cooked meals with minimum cost of gas in each case set out on cards, together with a comparison of the merits of coal and gas cooking respectively as regards economy both national and domestic.

c. Research into the possibilities of using town's gas in place of petrol as motor fuel.

d. Research (with the assistance of the London Coke Committee) into the possibilities of using coke for commercial motors, in order to cope with the shortage of petrol and coal, and establishment of coke depots on main routes for picking up supplies.

(In addition to the foregoing, the Institution of Gas Engineers and the National Gas Council have been active in promoting the erection of benzol and toluol recovery plant and in applying to the Government for the right to submit the gas manufactured to test according to calorific and not illuminating power.)

2. *Food.*

a. The equipment of demonstration rooms and arrangement of demonstrations in economical cookery (often given by members of the Women's Advisory Staffs of the respective undertakings).

b. The arrangement of showroom window displays of war dishes, uncommon foods, diluted foods, etc.

c. Various kinds of work (*e. g.*, exhibitions, special local advertising, competitions for housewives and cooks) in connection with special campaigns, such as the home-made bread campaign.

d. The assistance by gas managers, either through direct representation on them or through indirect influence, of local War Savings and Food Control Committees.

e. The institution of economical cookery competitions, with prizes, in the schools.

3. *Life.*

The continuation of the peace-time policy of studying public health questions, but now with specific reference to war-time conditions, such as

a. The equipment of small dwellings for munition and other workers with
i. Penny-in-the-slot gas cookers.
ii. Penny-in-the-slot gas coppers for water heating.
iii. Penny-in-the-slot gas fires.

b. The equipment of canteens, baths, huts, etc., in munition and other factories.

c. The refuse-destruction and anti-fly campaign.

d. The smoke abatement campaign.

e. The "Baby Week" campaign.

III. The Publicity undertaken by the Association was (alike to its advertisement "copy" and illustrations, and as to its editorial articles supplied by invitation to various journals) systematically co-ordinated with the practical work done, as will be shown by the following items under the two heads of—

A. War Equipment.

B. War Economy.

A. War Equipment.

a. The publication of articles and advertisements calling on manufacturers of munitions and all goods necessary to the successful prosecution of the war to use gaseous fuel and speed up output.

b. The publication of special issues of "A Thousand and One Uses for Gas," dealing with every kind of munition of war (not merely guns and shells), and of speeches made by experts before meetings of learned societies.

c. The issue (through the monthly *Bulletin*, etc.) of appeals to gas managers to arrange exhibitions and demonstrations of gas furnaces, etc., in showrooms, works, and other suitable buildings in manufacturing districts.

d. The furnishing of useful and important information to the Ministry of Munitions, manufacturers of munitions, etc.

B. War Economy.

1. *Fuel.*

a. The furnishing of information to various Government departments as to the advisability (from the point of view of national fuel economy and the recovery of valuable by-products) of using gas for every possible purpose in factories, Government offices, etc., which information later became the basis of several Governmental pronouncements on the subject of fuel ecenomy (*e. g.*, with special reference to immediate needs, and also with a view to the larger question of conservation of the world's coal supplies, by economical use, recovery of by-products, etc. This is a natural continuation of the policy of the Association in assisting by all means in its power the influential smoke abatement campaign).

b. The publication (in the *Bulletin*, etc.) of appeals to gas managers, asking them to do their full share in the recovery of benzol and toluol. (This was left optional by Government—certain concessions as to tests, etc., if done.)

(*Continued on page* 166)

Photo Courtesy of Welsbach Company
GAS LIGHTS USED IN INSPECTING FINISH OF SHOES

Chicago Employees Organize Cooperative Buying Scheme to Cut Living Costs

"The high cost of living" as it affects the 3,500 employees of the Peoples' Gas Light & Coke Company of Chicago is about to be considerably curtailed. Through the Advance Club, a house organization, the employees have decided to enter into a scheme of co-operative buying of groceries. At a single stroke the 3,000 families represented among the employees of the People's company have wiped out the middleman's profit. What their saving will be it is impossible to say at present, but it will no doubt run into many thousands of dollars weekly.

A representative of the club in each of the forty-nine departments of the company will take the orders of the employees in his department one day each week. A weekly list, showing the wholesale prices of the various commodities and the quantities in which they may be obtained, will be posted in each department where it can easily be seen.

Headquarters of the co-operative buying club will be located in the smoking room of the Peoples' Gas Building and the buyers will be required to call for their purchases at specified times. To eliminate the possibility of the accumulation of large stocks of groceries a storage charge will be imposed on all members who fail to call for their groceries between 11 a. m. and 2.30 p. m. on the day specified for deliveries. The club will buy each week only what is ordered by the aggregate membership, and as cash must accompany each employee's order, no capital will be required by the club and each week's stock of groceries will be fresh from the wholesaler's or manufacturer's plant.

Perry Gas Company to Move Its Offices

The Perry Gas Works office, which has been located for some time in the Marckres Building on Second Street, Perry, Ia., will be moved on September 1 to the James Building on Willis Avenue, according to a statement made by Manager R. B. Ingle.

The gas company gets the west half of the big room and alterations suitable to their needs will be made this month. A partition will be built dividing the present store room and an addition will be constructed at the rear to be used as a store and supply room for the company. Suitable offices will be arranged and the whole room finished to conform to the needs of the gas company. This will give better display and more efficient arrangement.

Illinois Coal Situation Settled and Agreement Signed

The coal situation, which has been hanging like a sword over the heads of the gas companies of this state that are dependent upon coal for the production of gas, at last has been clarified. After all sorts of conferences between the state council of defense, operators of coal mines, representatives of the miners themselves and the governor an agreement finally was reached and signed by the governor and representatives of the operators as a result of which, it is believed, the coal consumers of the state are assured of an adequate supply and a reasonable price on coal.

The agreement was reached in the early hours of August 11 after an all night conference behind locked doors. The conference ended when Governor Lowden appointed Chief Justice Orrin N. Carter of the state supreme court as coal director, and the operators agreed to the appointment and to accept the prices fixed by Justice Carter. Justice Carter is given power also to arrange with the railroads for equitable distribution of coal to all sections of the state and for its sale at fair retail prices.

The agreement came only after the state council of defense had recommended to the governor that the state seize and operate during the period of the war the coal mines of the state unless the operators reduced prices. The governor was informed by high legal authorities that he could make such seizure without calling an extra session of the legislature and without preliminary court action.

"Salus populi suprema lex" (the safety of the commuiity is the supreme law) is a principle as old as government itself," said the report of the law committee of the council of defense to the governor.

The agreement signed by the governor and the operators follows:

The operators agree to reserve the amount of coal necessary for consumption by the people of the state of Illinois and to sell same at prices to be determined as hereinafter provided.

The governor is to appoint a representative to be known as director of coal to act in the governor's behalf upon all questions arising as to the production, prices, distribution and transportation of coal to be consumed by the people of Illinois dur-

ing the remainder of the coal year expiring March 31, 1918.

The state council of defense is to appoint a committee of three of its members to act hereunder.

The Illinois coal operators are to appoint a committee of three, who are to be granted full power to act upon behalf of all the coal operators in the state of Illinois with respect to all such questions.

The mine workers of Illinois are to appoint a committee of three members, who are to be granted full power to act upon behalf of their organization upon all such questions.

The director of coal shall have the power from time to time to determine the price of coal at the mine mouth, in the various districts of the state, to be sold, as above set forth, to consumers in the state of Illinois; such price, however, in no case to exceed the maximum price, as fixed from time to time by the Federal Government. Such director of coal, before determining any price of coal, shall, in respect of such price, give to all the above named committees an opportunity to be heard.

The director of coal and the three above named committees are immediately to take up the subject of distribution and retail prices with the coal retailers of the state to the end that the retailers join with the operators in the powers herein conferred and to be conferred upon the director of coal, so far as retail prices may be concerned.

The director of coal and the three above named committees are immediately to take up the subject with the railroads to the end that the railroads join with the committees herein provided for in the powers herein conferred and to be conferred upon the director of coal, so far as the question of transportation may be concerned.

It is the substantial essence and spirit of the arrangement provided for by this instrument that all action of every kind taken or to be taken under this arrangement shall be had and taken with the utmost possible dispatch.

Judge Carter immediately took charge of the situation and called a conference of the representatives of the operators, the miners and the council of the defense for the following Monday at which will be taken the first steps toward cutting the prevailing high prices of all grades of coal.

Only one disturbing element remains, the strike of approximately 12,000 of the 80,000 coal miners of the state. The operators say the strikes are due to the fact that miners have read so much about the "exorbitant profits" being made by the mine owners that they are abrogating wage agreements and demanding "their share."

A joint conference of the representatives of the miners and the Illinois Coal Operators' Association will be held at Springfield within the next few days in an effort to adjust the differences at the mines of Central and Southern Illinois.

War Work of the British Association

(*Continued from page* 164)

c. The publication of special articles, advertisements, and letters explaining the new calorific standard and its effect on the public gas supply.

d. The preparation and publication of special "fuel economy" advertisements and pamphlets urging, among other points, the careful reading of the meter.

e. The establishment of contact with public men billed to speak on "Fuel Economy" or other topical subjects, by sending them well in advance reliable matter regarding the use of gas.

(This is a continuation of the Association's pre-war policy of never losing an opportunity of educating influential and unbiased public opinion.)

f. The despatch of specially prepared letters to professors of science throughout the Kingdom offering to supply them with literature relating to the most recent developments in the science of gas manufacture, supply, and application to industry.

g. The publication in educational papers of a special series of "Teachers' Notes for Lessons" on the Domestic and Industrial Uses of Gas—a continuation of a pre-war series on the manufacture, distribution, and use of gas—intended to educate the country's future housewives, scientists, and industrial workers in a proper appreciation of the value and economy of gas.

2. *Food.*

a. The issue (in the *Bulletin* and by letter) of appeals to gas managers to arrange demonstrations, exhibitions, etc.

i. At the beginning of the war, in co-operation with any local committee undertaking economy propaganda; and later

ii. During the time of the submarine menace, in co-operation with the Government's War Savings Committees working in conjunction with the Food Controller and his staff. (See *d* below.)

b. The publication of special articles and advertisements appealing to the general public in connection with *a* above.

c. The organization of special publicity campaigns—for example, the publication in the general press of advertisements setting forth the advantages of home-made bread and offering special pamphlets on baking bread in the gas cooker. Also the preparation on behalf of gas managers of schemes for the practical prosecution of these campaigns in their respective districts.

d. The co-operation of the Association's whole organization with Food Controller and his staff (with his approval) in the following ways:

i. By the publication of advertisements co-ordinating fuel and food economy.

ii. By the issue to Association members of a specially drawn up circular containing suggestions as to assistance to be given by them either on or through local War Savings Committees.

iii. By the issue of a special "Communal Kitchen" number of "A Thousand and One Uses for Gas."

iv. By the publication of special pamphlets drawn up for and with the approval of the War Savings Committee, and adopted as Government pamphlets.

3. *Life.*

a. The publication of articles, pamphlets, and advertisements in medical, municipal, professional, and other papers on—

i. The housing of workers.

ii. Welfare work in factories and workshops.

iii. Refuse destruction and fly peril.

iv. The Smoke Abatement Campaign and the use of gaseous fuel.

b. Active co-operation with infant welfare authorities generally, and in particular with the National Baby Week Council in the following ways:

i. By the issue of appeals to

managers to assist in the work of local advertising, etc., in preparation for "Baby Week" (July, 1917).

ii. By supplying the Baby Week Council's special literature to gas managers and asking them to keep it in their showrooms.

iii. By drawing up and publishing special advertisements and in particular a "Baby Week" gas pamphlet "Safeguarding the Babies." This was also published *in extenso* and well in advance in the leading educational papers, as the basis for lessons by domestic science teachers during "Baby Week," and quantities offered to teachers free of charge for distribution to older girls to take to their homes for further study, both for essay writing and for influencing parents and others on the vital question of "saving the future" at a time when we are against our will obliged to destroy life in this generation.

Gas Institute President Retained to Study Winnipeg Gas Rates

The Winnipeg Electric Railway Company, owners and operators of the Winnipeg (Manitoba, Canada), Gas Works, recently applied to the Utilities Commission of the Province of Manitoba for permission to increase the price of gas 30 cents per 1,000 cu. ft., owing to the increased cost of coal for gas making, amounting to over $3.00 per ton over last year's price.

After several hearings before P. A. Macdonald, sole commissioner, at which the company presented conclusive and undisputed evidence showing that the cost of manufacturing gas during the present year would be over 30 cents per 1,000 cu. ft. higher than formerly, by reason of the one item of additional cost of coal alone, the commissioner on July 18, 1917, issued an order that the company be permitted to increase the price of gas 15 cents per 1,000 cu. ft.

In his decision the commissioner refers to the opposition of the city to any proposal to increase the price of gas, and sums up as follows:

"The question is then narrowed down to this: A loss of $135,000 must, from present indications, be sustained by the gas company this year. Shall the company bear it, or the consumer?

"To aid a decision of this question we must examine the powers of the commission and the reason for the restriction imposed by the Act on the right of the company to raise its rates at will. The power is absolute to approve or disapprove the increase asked, and the reason for it is to furnish to the consuming public a measure of control that is entirely wanting in a business of a monopolistic character. If the company were carrying on a business that was capable of being affected by competition it would, under circumstances like the present, have to consider the justice and wisdom of asking its customers to assume all the loss when those customers, though theirs to-day, might to-morrow leave them and deal with a rival company.

"A wise and expedient course would call for a division of the burden and it would be expected that at least an equal share of the loss would be assumed by the company before asking its customers to contribute the other half.

"Actuated by these considerations the commission grants the application of the company to the extent of one-half the increase asked, and an order will issue effective as of this date. This order is a temporary one and will be superseded by an order to be made as soon as an investigation, which will at once be undertaken, can be completed."

Subsequently the commission appointed Alfred E. Forstall, consulting gas engineer of New York and president of the American Gas Institute, as its expert to investigate the conditions relating to the cost of manufacture of gas at Winnipeg, and Mr. Forstall will at once proceed to thoroughly study the Winnipeg conditions and report to the commission as to a fair and reasonable price for gas in that city.

As consulting engineer to the Winnipeg Electric Railway Company, Frederick Burnett, of Merrifield & Burnett, consulting gas engineers of Toronto, appeared at the several hearings, where conclusive evidence was presented that the gas department was not making, at the old gas prices and with coal at former rates, a rate of return on the actual capital invested in the gas plant of more than 5 per cent, *without allowing for depreciation*, so that the action of the commissioner, and his reasons for his action, were a great surprise.

Well Struck at Lawton, Okla.

Keys Well, No. 2, was brought in recently with a flow of gas which, according to the estimates of geologists who were on the ground, is 20,000,000 cu. ft. per day. The gas sand was penetrated at a depth of 2,200 ft. The well is located on the northwest quarter of 27-1 south.

Fire Prevention Publicity of Underwriters Board

The National Board of Fire Underwriters of New York are working in co-operation with the Council of National Defense, and are mailing to a list of some 66,000 of the leading manufacturers in the United States a booklet of directions for the prevention of fire, under the title

A Patriotic Duty of Every American Is to
PREVENT FIRE
1. Learn the factory safety rules and observe them.
2. If you discover a fire, give the alarm promptly. Do you know how to do this? Ask to be shown.
3. Don't smoke where it is not permitted.
4. Never drop a lighted match, cigar or cigarette; be sure that it has no spark left before throwing it away.
5. Report suspicious strangers seen about the plant.
6. If you notice any unusual smoke, the overheating of any machine, or any other accident, notify the foreman at once.
7. Carry your precautions into your own home; keep your house and yard free from rubbish, and help others to do the same.
Where would your job be if this plant should burn?
Help Uncle Sam
BE CAREFUL

FACTORY PLACARD DISTRIBUTED BY BOARD OF FIRE UNDERWRITERS

of "Safeguarding Industry," together with a show-card of fire prevention rules for employees..

A reproduction of the employees' rules is shown herewith, and brings out the vital points in a most interesting manner.

The cover of the book contains the following message, signed by President Wilson:

"Preventable fire is more than a private misfortune. It is a public dereliction. At a time like this of emergency and of manifest necessity for the conservation of national resources, it is more than ever a matter of deep and pressing consequence that every means should be taken to prevent this evil."

(Signed) Woodrow Wilson.

Hamilton Municipal Plants Lose Money

The municipal plants at Hamilton, O., lost money during July, according to the monthly report of City Auditor Erb.

The gas plant deficiency is $3,134.48, the electric light deficiency $1,103.80 and the water plant gain $1,954.46.

Personal Notes

FRED W. SEYMOUR, for several years superintendent of the Grand Rapids Gas Light Company, has resigned his position to become manager of the Battle Creek (Mich.) Gas Light Company.

WALDO A. LEARNED, who has been general superintendent of the Newton & Watertown (Mass.) Gas Light Company for 35 years, has been elected president of that company.

JOHN L. TUDBURY, superintendent of the Gas Light Company at Wenham, Mass., has been elected as a member of the directorate in the place of S. W. Winslow, deceased.

GEORGE T. WILLIAMS has been appointed general foreman of the by-product coke plant of the Brier Hill Steel Company, at Youngstown, O., and is in charge of its operations. Mr. Williams was formerly operating engineer with the H. Koppers Company, which built the Brier Hill plant.

Mr. Williams has had extensive experience, having been connected with the operation of plants of the Leclede Gas Light Company, St. Louis, Mo.; the Gas Light Company, St. Louis, Mo.; La Belle Iron & Steel Company, Steubenville, Pa., and the Inland Steel Company, Inland Harbor, Ind.

SUSMAN MITCHELL, president of the First National Bank, has been selected as receiver for the Central California Gas Company. The company was recently sued for $300,000 in a foreclosure suit by the Los Angeles Trust & Savings Bank. The appointment was made by the superior court.

Construction Notes

Gas Turned Into Long Island High Pressure Line

The high pressure gas main recently installed by the Long Island Gas Corporation from Sag Harbor to Bridgehampton, Water Mill and Southampton, a distance of eleven miles, and the necessary distributing mains in Southampton, have been completed and the gas turned into the system.

The first meter was installed July 23 for the Irving House at Southampton. Their equipment, according to information kindly furnished by R. C. Graveley of the Sag Harbor office, includes two sections of hotel units, one hotel broiler, one pastry oven, one large plate warmer, one food warmer and one 5-gal. coffee urn. Their consumption will average about 60,000 cu. ft. per month.

At the Southampton Canning Depot this company installed fifteen 2-burner Vulcan Hot Plates and one No. 423 Vulcan Water Heater. It is estimated that the consumption will average 4,000 cu. ft. per day.

Three small hotels, one quick lunch and many private residences have also been connected up, and the demand is steadily growing each day.

Eight-Inch Main for Camp Extension at Rockford, Ill.

Orders for the extension of gas service to Camp Grant, Rockford, Ill., have been received at the office of the gas company after weeks of negotiations. Plans were prepared by Manager Whipple, who went east three weeks ago. Trips to Washington from Philadelphia followed and the upshot of the conferences was the decision to use gas service in the Rockford cantonment.

An eight-inch main for a high pressure service will be laid on Kishwaukee Street to the camp's edge. The service is already extended to the Spengler plant, 1,200 feet from Harrison Avenue. It is a mile from Harrison Avenue to the northern boundary line of Camp Grant. The eight-inch main will be continued inside the camp for a mile and there will be extensions of three, four and six-inch mains.

NEED NOT ENLARGE PLANT

It will not be necessary to enlarge the local plant. The Rockford plant was built with an eye to Rockford's future. It has a capacity of 3,000,000 cu. ft. a day. At the present time, the customary slack period, it is turning out probably 1,000,000 ft. a day.

"The big questions are pipe and labor," said Manager Whipple. "But we can put the enterprise through in three weeks' time if necessary. That, however, probably would require a ditching machine. The cost of the extension can be estimated at from $30,000 to $35,000."

The extension of the gas service means the installation, it is understood, of not less than 600 single unit gas stoves. It is surmised that this contract will be let in Rockford as a natural course. This would mean a tidy boost for the Eclipse Gas Stove Company.

Work Begun on New Waterbury Plant

An up-to-date gas plant of a type which exists in only a few cities in the country will be built on the property known as the rye lots in South Brooklyn, purchased some time ago by the Waterbury (Conn.) Gas Light Company. Work has already been started on the new plant and plans have been filed in the office of the building inspector showing details of the gas-making plant. The new plant will be a big departure from the old style of gas plant and will use the coal gas process; the tanks will not be as large as those on Jackson Street. The plant will cost in the neighborhood of $75,000, according to estimates filed with Deputy Building Inspector Edward E. Mraz.

More New Main at Plymouth, Mass.

Having completed their task of putting in the new screw-jointed 8-in. gas main on Main street, the laborers of the Plymouth Gas Company are now laying an extension of the pipe through a part of Town Square and southerly on Market Street.

THE NORTHAMPTON (MASS.) GAS LIGHT COMPANY has recently had constructed a 70,000-gal. oil tank which is unique in some of its features. It was necessary to secure approval for construction from the state police, and this body objected to an unprotected steel tank because of possible dangers from leaks or bursting. The state police recommended a concrete wall around the base of the tank and at a sufficient distance from it to have a capacity equal to that of the tank itself, above the level of the wall, below whose top no overflow could, of course, occur.

The necessary permit was obtained from the local authorities and the tank and wall were built as recommended. The tank is connected with the railroad siding by a pipe line. It will hold about enough oil for five months' supply.